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ABSTRACT

This work synthesizes 14 case studies from different countries that were developed as part of the "School Map" project. The project developed a methodology to identify and to project the spatial characteristics of an educational system so that the existing distribution of educational opportunities can be diagnosed and an educational plan designed to reduce disparities in the provision of educational services. A summary of the principal conclusions of the investigation, found in the first four chapters, indicates the diversity of the fields of application of the school map in educational planning. Chapter 5 puts forward a number of preliminary conclusions reached in the course of the research work into concrete problems connected with the school map. Chapters 6 through 10 deal with methodology and are designed as a working manual for educational planners and administrators. The problems of the implementation of plans are discussed, and some conclusions are drawn regarding the limitations of the planning process. (Author/MLF)

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Jacques Hallak

PLANNING THE LOCATION OF SCHOOLS

An instrument of educational policy

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Preface

In this volume Jacques Hallak has brought together the insights gained from studies on the location of schools undertaken under the auspices of the "School Map" project of the International Institute for Educational Planning (IIEP).

This project was initiated as a response to the needs of many Member States to expand their networks of schools at the primary and secondary level. In this effort, appropriate methods for the location of schools have become critically important as a means to ensure that, in implementing educational plans, optimal use is made of resources available for the expansion of existing school systems.

Against this background, the project on planning the location of schools within the context of overall plans for the development of educational systems had to:

(a) identify and analyse all factors—pedagogical, economic, geographical, social, administrative, political—which must be taken into account in determining the optimal location of schools;

(b) formulate a methodology in sufficient detail to make it useful as a guide to educational planning in a wide range of Member States, while keeping it sufficiently flexible to accommodate the particular conditions of each country;

(c) apply the methodology to concrete problems facing educational planners in the reality of their development tasks, such as introducing universal first-level education, implementing educational reforms, etc.

Case studies in a carefully-selected sample of countries in Africa, Asia, Latin America and Europe formed the empirical basis for the project. These studies were carried out with the close collaboration of national authorities and consisted of the following stages:

1. A critical analysis of the features of the existing network of first- and/or second-level schools in one or more educational areas of 50,000—200,000 inhabitants, selected for the variety of problems they exhibited.
2. A study of the medium-term evolution of the potential school population, taking account of demographic factors, educational objectives and certain socio-economic variables.
3. Proposals for rationalising the location of schools, based on the findings of the two prior stages.

These case studies have been published by the IIEP and provide the interested reader with a wealth of detailed information on the actual implementation of school map methodology in a particular setting.

The methodology which has been developed in the course of this project and which is presented in this synthesis volume represents an important addition to the *instrumentarium* of planning the development of educational systems. Its importance lies in drawing our attention to the *spatial* dimensions of educational systems and in providing us with the analytical tools both to identify and to project the spatial characteristics of an educational system as part of the overall educational planning effort. This is a timely addition, as educational planning is becoming increasingly concerned not just with the aggregate expansion of educational systems in terms of the overall number of schools, teachers and students, but with changes in the distributive characteristics of educational systems across different regions, settlement types and social strata in a given country. In and of itself the methodology of the school map will not, any more than any other methodology or technique, achieve greater equality in the provision of educational services. It will, however, become a useful tool in the hands of the policy-maker who is determined to diagnose the existing distribution of educational opportunities and to design an educational plan that is geared to reducing whatever disparities the diagnosis of the present situation reveals.

In the work of the International Institute for Educational Planning, this concern with the rôle of educational planning in the provision of greater equality of educational opportunities is assuming more and more importance since the school map project has opened up both some of the problematic issues and the methodological possibilities for coping with some of the problems.

A project of this kind accumulates many debts in the course of its conception and implementation, and I wish to express, on behalf of the Institute, my appreciation to all those who have helped in bringing the project to successful completion. The project clearly owes a great deal to the leadership and perseverance of Jacques Hallak, who has been responsible for its organisation within the IIEP. Several Member States have kindly agreed to co-operate with the Institute in the organisation of individual case studies and have generously made personnel and information available for this purpose. I do hope that the case studies provide a useful return to each participating country on this investment.

Much of the Institute's research, especially in developing countries, is financially supported by voluntary contributions made by various Member States to the IIEP. For this particular project, funding from the following sources is gratefully acknowledged: Ministry of Overseas Development (United Kingdom), Swedish International Development Authority (SIDA), Canadian International Development Agency (CIDA) and the Norwegian Agency for International Development (NORAD).

Hans N. Weiler
Director, IIEP

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The case studies

The case studies undertaken in connection with the IIEP research project on Planning the location of schools, and details of their publication, are as follows:

1. *Planning the location of schools: County Sligo, Ireland* by Jacques Hallak and James McCabe. Paris, Unesco: IIEP, 1973 (in English only).
2. *Méthode de préparation de la carte scolaire: Aurich, Basse-Saxe, République fédérale d'Allemagne* by Hans-Jürgen Back, Bernard Kirfel, Norbert Kulmsee and Reinhard Martinsen. Paris, Unesco: IIPE, 1974 (in French only).
3. *Planning the location of schools: Ankole District, Uganda* by W. T. S. Gould. Paris, Unesco: IIEP, 1973 (in English only).
4. *Planning the location of schools: the District of Kaski, Nepal* by James McCabe and N. R. Padhye. Paris, The Unesco Press, 1975 (in English only).

*5. *Méthode de préparation de la carte scolaire: le caza de Zahlé, Liban* by E. Khoury, A. Chemaitelly, E. Wardini, K. Abou-Rjaili, M. Zaatari and H. Hajjar. Paris, IIPE, 1975 (in French only).

*6. *Méthode de préparation de la carte scolaire: le Charestan de Chahroud, Iran* by J. Hallak, K. R. Sohrab, F. G. Saghafi, A. A. Minaie and M. S. Sheikhestani. Paris, IIPE, 1975 (in French only).

*7. *Méthode de préparation de la carte scolaire: Casablanca, le Gharb, et Kénitra, Maroc* by Guy Porte, René Boudet, Abdel Badou, Jacques Hallak, René Bernard and Jacques Poncharal. Paris, IIPE, 1976 (in French only).

*8. *Método de preparación del mapa escolar: la Región de San Ramón, Costa Rica* by J. Hallak, F. Caillods, I. Brjeska and L. Secco. Paris, IIPE, 1976 (in Spanish: mimeographed French version also available).

*9. *Méthode de préparation de la carte scolaire: les sous-préfectures de Sikensi et Dabakala, Côte-d'Ivoire* by J. Hallak, G. N'Guessan, A. Krizo and B. Duvieusart. Paris, IIPE, 1976 (in French only).

*10. *Planning the location of schools: Sri Lanka* by Ananda W. P. Guruge in co-operation with K. D. Ariyadasa. Paris, IIEP, 1977 (in English only).

*11. *Méthode de préparation de la carte scolaire: le Daïra de Bouira, Algérie* by K. Bensalah. (In French only: in preparation.)

*12. *Méthode de préparation de la carte scolaire: répartition des écoles d'enseignement générale en URSS* by V. A. Jamine, S. L. Konstaniane, K. G. Nojko, and V. N. Oussanov. (In French only: in preparation.)

*Obtainable only from the IIEP.

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Jacques Hallak

General introduction

1. Why plan the location of schools?

Since the beginning of the sixties criticism of the school as a part of our lives has intensified.

In Europe and North America, school buildings are condemned as 'dehumanising and impersonal places without any human warmth'; the school's monopoly in the matter of preparing children for adult life is contested and new educational structures are being advocated. Illich has argued that society should do away with schools and create open structures better adapted to the outside world. Current experimentation shows that there is already a trend in this direction; in California some parents of high cultural attainment are taking their children out of school and giving them 'tailored' instruction at home. Thanks to the development and improvement of computers, video-cassettes and other teaching aids, parents and children are encouraged to call for the abolition of compulsory attendance at school.

The Parkway 'school-decentralizing' experiment at Philadelphia is a step in the same direction. In addition, the 'bringing the community to the school' concept or the opening-up of teaching to people in other professions or trades, as is done in university summer courses in Europe, may also be seen as symptomatic of a 'bursting-open' process, and indicative of the dispersal of the school geographically and socially.

In the light of this trend, the reader may well question the utility of a work devoted to a methodology for determining where schools are to be located. Can one really consider school-localization techniques a priority-matter at a time when certain specialists are stressing the need to find apprenticeship solutions outside the school system and still others simply call for the closing-down of the schools?

The present work does not set out to undermine the criticisms levelled at the school system nor is it intended to evaluate those proposals for education outside the school system put forward by the experts. However, it is worth pointing out that while there is something like a consensus concerning the limitations of traditional schooling, no agreement has been reached in respect of solutions. A small number of educators would replace schools by complex systems for organizing the production and exchange of knowledge, while others, and these are in the majority, still place their faith in traditional schools, regard them as a suitable place for teaching, remain convinced that the aims of the system need to be revised, argue out-of-date teaching methods must be abandoned, and admit, finally, that there is little practical justification for much of what is taught. In other words, it is the aims, methods and content which need to be changed rather than doing away with schools; what has to be done is to remodel and adapt them, to bring them closer to the needs of those who use them. In support of this policy, educators advance two arguments:

(a) No country has yet succeeded in replacing an education system based on the school by an education process outside the school. What one sees rather are pilot projects, small-scale experiments, or theoretical proposals still in the research and experimental stage and limited to particular circumstances; these often concern exceptionally gifted children with highly cultivated parents, or racial minorities, the physically or mentally handicapped, and so on.

(b) Desirable as they may be, all the suggestions for large-scale education without a school call for organizational methods to make use of available resources and for complex and elaborate management systems. As a result, it is very unlikely that they will be widely implemented in the next few years, even in technologically advanced countries such as the United States of America. Moreover, because of the problems to which they give rise, they are likely to be of benefit only to a privileged minority and may therefore aggravate educational discrimination as between the various socio-cultural strata of the population. All the more reason, then, to suppose that schools will not be done away with in the near future, nor replaced by other educational formulæ in developing countries, or in most of the industrialized countries. The obstacles in the way of such changes are many and are not restricted to the unresolved problems of how to organize mass education outside the schools; if one needs to be convinced of this, one has only to obtain the reaction of the immense majority of teaching staffs, administrators and pupils' parents to the proposal that the school be eliminated.

How will our society evolve? What chances are there that it will become a school-less society? Only time can tell. The impression one gets, however, is that while in the long run the replacement of the traditional school by machinery for school-less education is conceivable, it is unrealistic to expect to see a school-less society in the next ten to fifteen years.

In 1970 the world as a whole devoted about $20,000 million to setting up, expanding and converting schools. This year, and in the next few years, sums of the same order of magnitude will go to developing school infrastructures, which in turn will need increased financing to remain functional. The way the geographical distribution of these schools is organized will have an enormous influence on whether or not efficient use is made of the resources devoted to education. Consequently, giving thought to the techniques and methods of organizing educational supply, in other words *the school map*, must be regarded as a priority issue.

On the other hand, even if those in charge of educational policy place more and more stress on out-of-school instruction by emphasizing the development of continuous training, literacy campaigns, rural training, etc., methods of organizing educational supply in this field remain constant, so that in dealing with the methodology of the school map we are, in fact, also covering that of the out-of-school map. To be sure, different techniques are required for the map of continuous training and that of training on the job, but the conceptual bases for these, and for the school map, are overall the same.

What then is the school map? It is difficult to define it satisfactorily in a few lines. An enquiry undertaken by the International Institute for Educational Planning (IIEP) in 50 or so countries has shown that what the school map means, and what is expected of it, varies enormously from country to country (see Appendix to this section). In some countries, including Nigeria, the Philippines and New Zealand, the setting-up of school premises is done empirically under legislation governing area-standards and the way schools are run; in others, including Japan, Denmark and the USA, the school map has a more complex meaning in that, despite decentralization of decision-taking with reference to the localization of schools, a great deal of work is still being done on planning and co-ordinating the location of new schools in certain areas; in other countries finally, such as France, Bulgaria and the USSR, the school map is drawn up centrally on the basis of a simple and uniform method for the whole country.

As the chapters that follow will demonstrate, the definition which we have adopted draws on what is being done in different countries, but reflects no one point of view exclusively. Moreover, it seems appropriate at this stage of preliminary definition of the school map to comment on the purpose it serves, to fill in the conceptual framework and to explain how it is put into operation.

2. Purpose of the school map

The school map is part and parcel of the educational planning process and, as a result, one of its essential functions is to help realize the targets set out in the plan or plans. Of these targets the best known, and those most universally acknowledged, are the following:

(a) Giving all children of school age a basic education and extending teaching beyond the end of the period of compulsory education within the limits of the resources available and the country's economic and social requirements. This being so, it should be possible with the help of the school map to organize educational supply in such a way as to meet the requirements set out in the plan. As we shall see in Chapter II, there are case studies available which provide illustrations of how this planning goal can be achieved.

(b) Providing for 'equality of educational opportunity'. This target may be interpreted in diverse ways, but insofar as concerns the school map, the object is to achieve (i) a geographical levelling-out of the conditions of supply through the creation of equal intake capacities and an equitable distribution of human, material and financial resources over the various areas, and (ii) equal social opportunity for, and access to schooling through active measures encouraging children to go to school (e.g. setting up a school-transport service, canteens and boarding establishments) and opposing segregation of the sort where certain schools are attended by certain groups on a race or creed basis. In this connection, the reader will recall the bussing system of the USA. There is no guarantee that what is being done will meet with success.

(c) Making systems more effective by improving the ratio between costs and performance. When the school map is being drawn up the task will be to ensure that the utilization rates of premises, equipment and staffs and the length of time they are used are the highest possible, bearing in mind pedagogic, administrative and political limitations. The idea is to overcome the short-sighted view of the school as an isolated unit unconnected with the world outside by integrating the school map with a broader map of collective and regional development services. Like the hospital and the post office, the school forms part of a body of services to be distributed geographically in a consistent manner and in such a way that the working of external economic factors results in the most effective possible use being made of resources for schooling.[1]

(d) Reforming structures, curricula and methods: the rôle of the school map is vital in any attempt to reform education systems. The failures of reform programmes brought in in certain countries have been largely due to the lack of a school map. However highly developed a school system may be when a reform programme is brought in, there is a stock of schools with their specific features and their own characteristics reflecting in one way or another structures, curricula and methods; a school map should make it possible to determine how schools may be reconverted and premises re-allocated geographically so as to adjust supply to the education system's new characteristics as laid down in the reform programme. The experience of France provides a good illustration of the way in which the school map can be used in this connection. In 1959 a study was begun of an educational reform programme; this was adopted in 1963. The two main ideas behind it were to raise the school-leaving age to 16 and bring in a single type of first-cycle school, the *collège d'enseignement secondaire*. As a result, it became necessary to restructure existing schools, including the *lycée* and the *collège d'enseignement général*, and to increase the number of pupil-places to provide room for all children between 11 and 15. As it became necessary to invest very large amounts in school buildings and to take on the conversion and building of several thousand schools, the Ministry of Education could no longer make do with the empirical methods which had prevailed up until that time. A method and procedure had to be devised and introduced, with rules covering as many points as possible. It is here that we must look for the origin of the school map.

3. The conceptual framework

The school map may be regarded as a tool for analysis and as acting in the rôle of a bridge:

(a) between the drawing-up of the plan and the establishment of detailed procedures for carrying it out;

(b) between the fixing of overall goals and defining what they mean in terms of specific work at local level;

(c) between the voting of the total amount of funds centrally and estimating requirements in the light of local conditions.

It also helps to co-ordinate networks of schools of different levels and types of instruction. This involves a complex operation and calls for:

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[1] It was with this in mind that the Dutch Planning Procedure Committee drew up a diagnostic report on the country's school system. The country was divided into 80 areas in terms of what is usually called the 'nodal' criterion, i.e. a function of the intensity of people's movements between where they live and where they work, and areas were further identified on a basis of social, cultural and economic parameters. Finally, consideration was given to secondary-school catchment areas in urban centres and in rural areas. In other words, an effort was made to integrate the school map with the map of social and economic services.

(a) a method for the co-ordination of school networks;
(b) the breakdown of the aims of the plan by region;
(c) the drawing-up of memoranda to show what area goals mean in terms of work, taking into account the structure of the existing education system and the rules and standards laid down for schools;
(d) the drawing-up in detail of the local school map, which must take into account local requirements, local features and the specific problems of the area.

(a) Co-ordinating school networks
If the school map is to be organized rationally, there has to be a co-ordination of school networks, since any school in a given level draws upon students in schools at the level just below it.

Where compulsory education is concerned, the organization of a school network must take note of the geographical distribution of population. Here, boarding facilities and school transport should be the exception rather than the rule. The compulsory-education map will therefore be locally-based. Schooling after the obligatory period has largely the same characteristics in any area of the country. The map for the post-compulsory period will therefore have to be drawn up on an area basis but, quite obviously, with the compulsory-education map in mind; so far as possible, it should afford equal possibilities of admission for all children.

In the case of specialized education and university teaching, with all of the range of trades and specializations to be catered for, and the specific requirements of this region and that, organization can be accomplished only on a national scale, but here again, the map for specialized education and university teaching has to take into consideration the geographical distribution of compulsory schooling and (general) education after the compulsory period.

The result is a hierarchy of school maps, all of which need to be co-ordinated. This can be shown in the form of a diagram (see Figure 1).

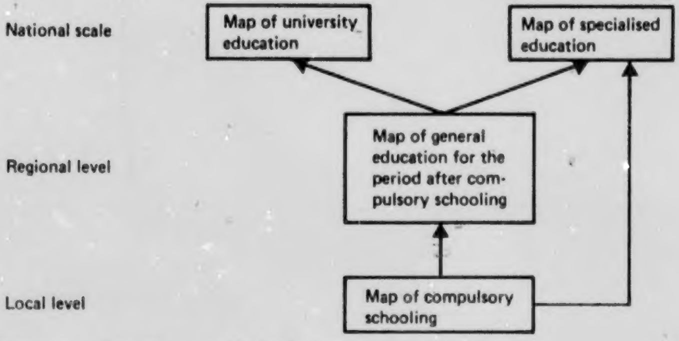
National scale
Map of university education
Map of specialised education
Regional level
Map of general education for the period after compulsory schooling
Local level
Map of compulsory schooling

FIGURE 1. *Co-ordination of school maps*

The distinction made in this section between national, regional and local perspectives varies according to country and it is hardly possible to generalize without commenting on special cases. In a country such as the Federal Republic of Germany, the main boundaries are those of the *Länder*, and inside the *Länder*

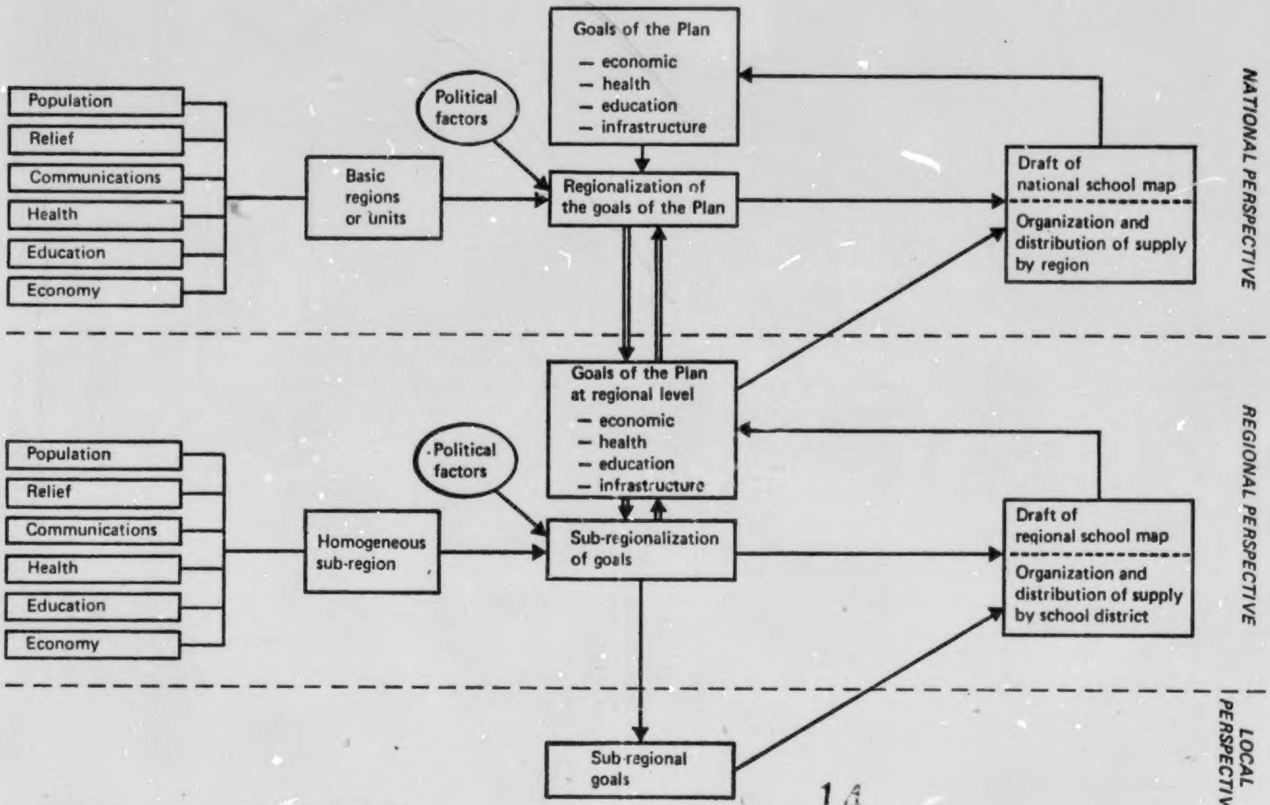
Population
Relief
Communications
Health
Education
Economy
Basic regions or units
Political factors
Goals of the Plan
— economic
— health
— education
— infrastructure
Regionalization of the goals of the Plan
Draft of national school map
Organization and distribution of supply by region
NATIONAL PERSPECTIVE
Population
Relief
Communications
Health
Education
Economy
Homogeneous sub-region
Political factors
Goals of the Plan at regional level
— economic
— health
— education
— infrastructure
Sub-regionalization of goals
Draft of regional school map
Organization and distribution of supply by school district
REGIONAL PERSPECTIVE
Sub-regional goals
LOCAL PERSPECTIVE

FIGURE 2. *Regionalization of the goals of the Plan*

those of the regions, and in each region those of the urban and rural districts, as is usually found with federated states. Moreover, a region with a population of five millions, forming part of a country such as Nigeria, may well correspond to a mere rural district in another country such as India or correspond in importance to an entire country such as Belgium.

(*b*) *Regionalization of the goals of the Plan*

Figure 2 shows how planning goals are regionalized. Within the national framework this regionalization of the goals of the Plan is imperative, and is always a prior condition for adoption of the school map. How indeed are we to determine the means to be employed in attaining goals unless we have a clear view of the characteristics of each region, together with a number of decisions on how national resources are to be allocated at the regional level? Again, how are we to decide where institutes of higher learning and establishments for specialized education are to be located if we are unable to compare the economic, educational and social make-up of each region with the requirements and possibilities of the country as a whole? The national school map is the ideal instrument for effecting the regionalization of the education plan; it forms an essential part of the map of official services and economic activities corresponding to the regionalization of the plan for economic and social development.

The national map and regionalization are both expressions of the same reality and it would be senseless to consider them in isolation or to speak of one without referring to the other.

Seen *regionally*, the task is to determine homogeneous geographical areas in the light of economic, demographic, geographical, administrative and other factors. If regionalization of national aims has to pass through the 'political sieve', this is even more true when the issue involved is that of the 'localization' of regional aims. This is a necessary stage, but it is not enough in itself; a minute analysis of the schools system in each area has to be carried out and account taken of the regulations in force, of local limitations, and of government standards. A regional school map organizing educational supply and distributing it over school districts is nothing less than a complete exercise in planning for each area, and any talk of a regional map in isolation from regional planning is tantamount to depriving both of their essential meaning.

(*c*) *Drafting national and regional maps* (*see Figure* 3)

The drafting of national and regional maps necessitates taking stock of two requirements already mentioned, namely the need to guarantee consultation between the various levels at which decisions are taken; and the need for regionalization of goals to give due weight to each region's features and specific requirements.

For instance, the draft of the national school map will be made centrally in close collaboration with national and regional development authorities and with departments of other administrative bodies concerned in order to ensure that the school map is integrated with the map of all official services, including infrastructures, housing, health, etc.

The draft must take account of the structure of the education system, i.e. how enrolments are distributed among the various types and levels of instruction. It must also take stock of regulations in force on the working of the education

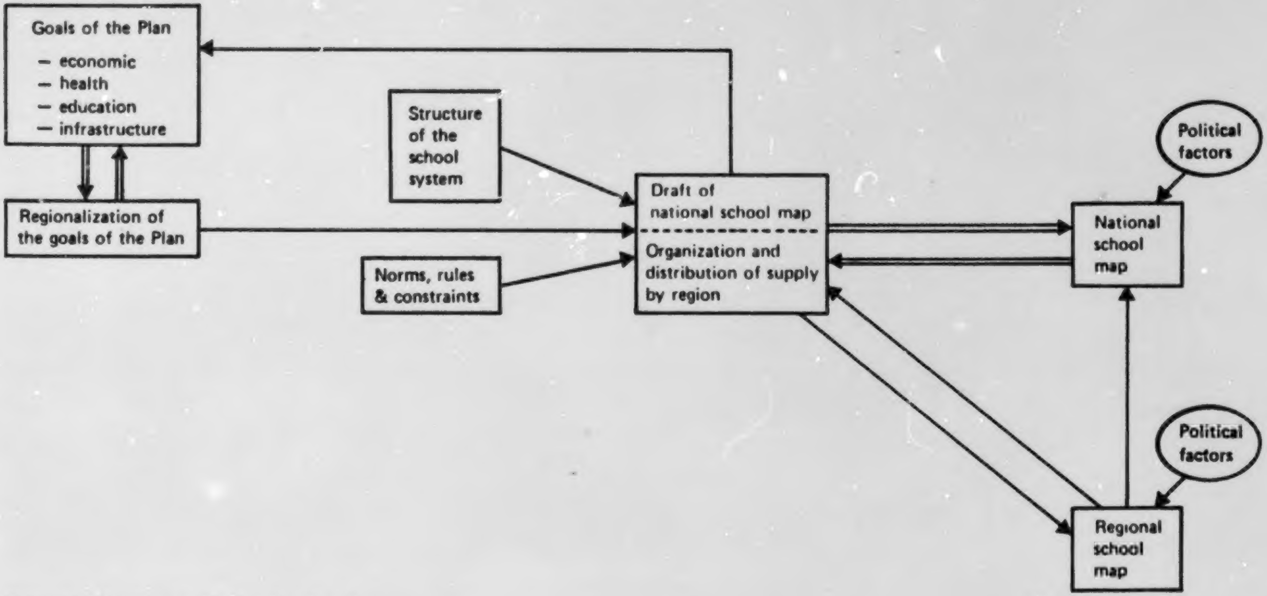
Goals of the Plan
— economic
— health
— education
— infrastructure
Regionalization of the goals of the Plan
Structure of the school system
Norms, rules & constraints
Draft of national school map
Organization and distribution of supply by region
Political factors
National school map
Political factors
Regional school map

FIGURE 3. *Drafting national and regional maps*

system, standards relating to premises and physical facilities, and criteria for catchment areas and accommodation for students and pupils.

The regional map will be drafted by the regional authorities. For reasons already stated, it will deal in the main with compulsory education and general education after the compulsory period. *Mutatis mutandis*, the procedure it follows should be similar to that followed in drafting the national school map. The drafting of the national and regional school maps will serve as a test of whether the goals set by the plan are realistic and whether the resources provided are adequate in view of the special features of the regions concerned.

(*d*) *Detailed work on the local map*

When it comes to work on the local map for each school district, it will be found that five interdependent methodological steps are required:

(i) *A diagnosis of the geographical distribution of supply.* The existing school map has to be examined to identify inequalities in the geographical distribution of staffing and schooling conditions.

(ii) *Establishment of:* (a) *criteria* for determining schools' catchment areas, such as population densities; (b) *standards* for school size, bearing in mind pedagogic, economic and administrative limitations (costs in a school with less than 15 pupils are prohibitive); (c) *standards* for floor-space and types of construction, supplies and equipment (2 sq. metres per primary-school pupil is the standard adopted in certain countries).

(iii) *Breaking down of school plan targets by area*, bearing in mind each area's development prospects; for instance, if the participation rate under the national plan is to reach 30 per cent for the 15 to 18 age-group, what is to be the target rate in each area?

(iv) *Projection of schooling requirements* in the light of the area breakdown of targets and demographic developments.

(v) *Elaboration of proposals for a future map* of premises in the light of a cost/performance analysis of various suggestions. (Is the decision in favour of 'school-complex' systems which stimulate social integration, or does it advocate small neighbourhood schools of a more 'workable' size?)

Figure 4 embodies what has to be taken into consideration in connection with the conceptual framework.

4. The procedure: participation or bureaucratic monopoly?

When it comes to procedure, the drawing-up of the school map must be the result of a number of successive steps involving central, regional and local authorities. Central administration works out the initial directives based on the aims of the Plan and, on the strength of these, the regional and local authorities formulate proposals. These are examined by central administration, whereupon the latter may find itself needing to alter its directives so as to bring them into line with the actual state of affairs in the regions and the variety of situations revealed. All this, in fact, is not a one-way street from the centre out to the outskirts but a succession of 'loops' linking up central administration's decisions and the proposals put forward by the regional authorities.

In other words, the adoption of the school map means accepting a set of rules

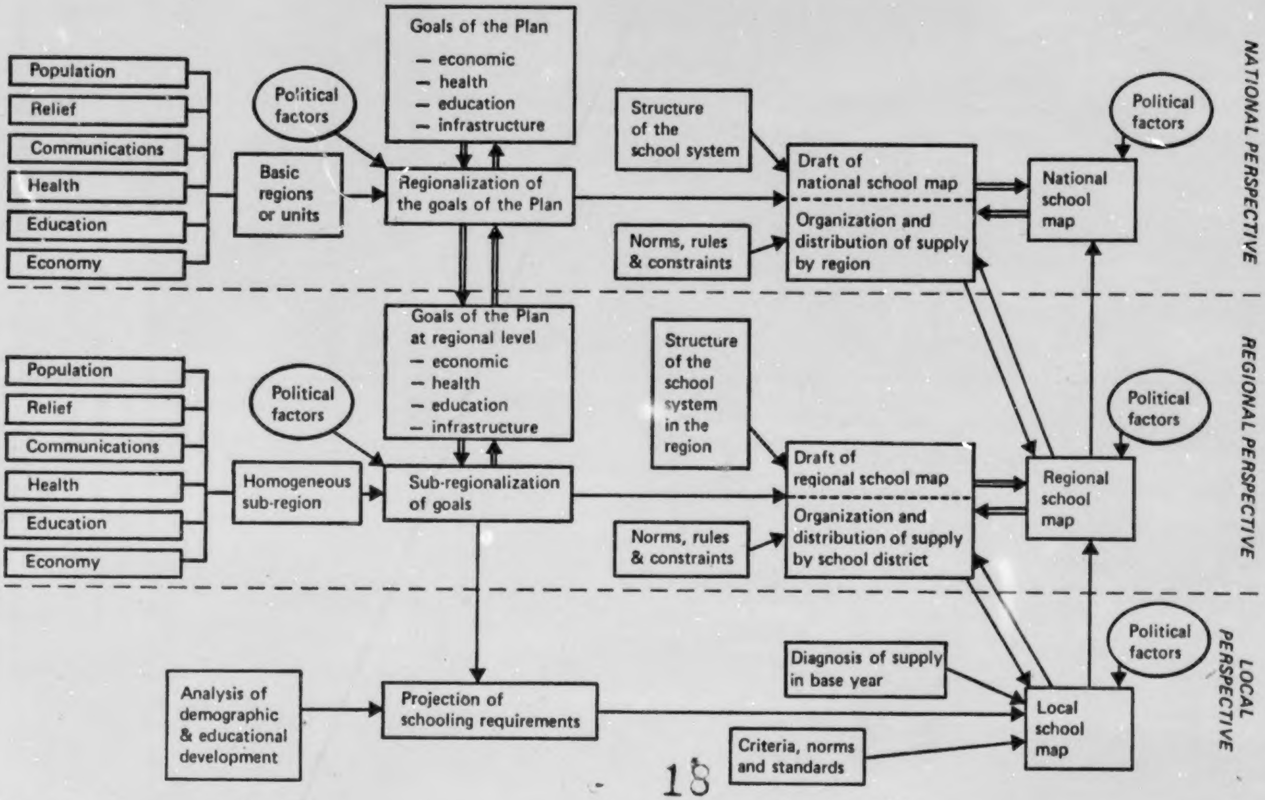
NATIONAL PERSPECTIVE
Population
Relief
Communications
Health
Education
Economy
Political factors
Basic regions or units
Goals of the Plan
— economic
— health
— education
— infrastructure
Regionalization of the goals of the Plan
Structure of the school system
Norms, rules & constraints
Draft of national school map
Organization and distribution of supply by region
Political factors
National school map
REGIONAL PERSPECTIVE
Population
Relief
Communications
Health
Education
Economy
Political factors
Homogeneous sub-region
Goals of the Plan at regional level
— economic
— health
— education
— infrastructure
Sub-regionalization of goals
Structure of the school system in the region
Norms, rules & constraints
Draft of regional school map
Organization and distribution of supply by school district
Political factors
Regional school map
LOCAL PERSPECTIVE
Analysis of demographic & educational development
Projection of schooling requirements
Diagnosis of supply in base year
Criteria, norms and standards
Political factors
Local school map

FIGURE 4. *The conceptual framework*

which influence the very principles of educational planning. On the one hand, there must be no authoritarian planning system centralized in the capital and handing down its directives on where schools are to be located without any possibility of 'censorship' at regional level; equally, there must be no acceptance of a decentralized and partisan planning system favouring some areas to the detriment of others and producing inconsistency between national goals and steps taken at area level. What is needed is a hybrid system offering the advantages of both.

In countries with a highly centralized system of administration, there is a lot of talk of 'decentralization' when the thought is really of 'deconcentration', in other words a monopoly of 'power' at the centre with those on the fringe reduced to acting as executives. Where countries have a traditionally decentralized structure, we meet with an insistence on the need to promote the integration of area initiatives, and a recognition that area autonomy is a sacred right.

There is sometimes a chance that those working at the centre on the Plan and the directives for the school map will pay attention to the opinions of the groups affected, the teachers and pupils' parents, the public and private bodies concerned with education, ministerial departments, etc. At regional and local levels, too, the school map must be the result of participation by representatives of regional and local bodies, and in particular pupils' parents, teachers' associations and the authorities in charge of what is being done in the matter of regional development.

It is evident that adoption and use of the school map pose two problems of task-sharing, the first being 'vertical', i.e. as between government departments and those in charge centrally and locally, and the other 'horizontal', i.e. as between the social groups concerned at each level where decisions are taken. This situation in turn gives rise to three appreciable dangers which may be summed up as follows:

(a) The danger of increasing bureaucratic monopoly of the planning system. In some countries employees of local authorities leave things to their opposite numbers in the region, who are themselves content to leave things to the civil servants at the centre. So far as such an extreme caricature is admissible, the school map becomes just one more tool in the service of bureaucratic and technocratic planners.

(b) The danger of legitimizing decisions that are fundamentally inequitable and anti-democratic. Broad consultation of the groups affected prior to the taking of decisions is an excellent means of gathering information on what people want. In no event should it serve as a pretext or cover for a policy; the variety of opinions put forward by the various local authorities will in most cases be such as to permit the decision-making power to adopt the policy it favoured from the beginning.

(c) The danger that power will be assumed by the best organized and most powerful groups. If, in order to avoid the two dangers just mentioned, arrangements are made for decisions on the school map to be taken exclusively by bodies where task-sharing is the rule, then a major new difficulty can arise, that is to say the organized groups with marginal representation, but with time on their hands for political dealings, will monopolize membership of school map boards. Experience with board-membership of university people in the USA shows that this danger is a very real one. Still more ominous is the spectacle of the local élite in some countries (chief of police, military commander, businessmen and president of the social club) masquerading as 'popular' representatives and participating in the name of the poor and oppressed in a new system of 'popular' planning.

To summarize, it has to be quite clearly understood that if the practice of task-sharing serves only to conceal temporarily from each member of the community the real needs of that community, then it will without any doubt make a reflex action of authority seem attractive and desirable and legitimize particularly regressive political moves. It would be a curious paradox indeed if a decision in favour of participation should have led to democracy's being killed off.

5. The content of this work

As has already been suggested, the school map raises the question of who is to plan and who is to decide in the matter of education. In what follows, we shall not be putting forward any formula as an answer to this. It is a political problem which cannot be resolved by technical means. And yet, as Figure 4 shows, political factors have their influence, both on the national map and on the regional and local maps. That we see fit to discuss them should not be interpreted to mean that we consider them as part of the methodological guidance which this paper sets out to give. Since no technique can be completely neutral, we are obliged to find space for a wide range of national happenings and developments influenced by a variety of ideological and political systems. This then, with all its shortcomings, is what we have tried to do in this work and in the research project it summarizes. The project was carried out in three stages. Firstly, an extensive inquiry was undertaken in fifty or so countries with a view to recording what was being done in connection with the school map. Although such particularly relevant examples as those of China and Cuba were not covered, the inquiry revealed a diversity of situations reflecting prevailing ideological and political systems. It confirmed, as was to be expected, that many countries, despite statements to the contrary, are not doing any educational planning and that their school maps are the results of hazard, improvisation or *laissez-faire* attitudes. Secondly, once the resulting reports had been examined, a dozen countries agreed to co-operate with IIEP, either to study their own experience in the matter of the map or by means of pilot studies to work towards methodologies susceptible of general application at national level. In a third stage, the findings of these studies and the general conclusions of the research work undertaken were written up, and tested at a number of training seminars. This work synthesizes the case studies and puts forward a methodology for the drawing-up of the school map—a methodology which, as will be seen, centres round the regional and local map.

The fourteen case studies are of particular interest in that each of them represents pilot research in different fields of application of school-map methodology and leads to original conclusions in respect of the principles of educational planning, as well as in the field of education policy. They touch on Asia, Africa, Europe and America, they cover rural areas and urban districts, primary, middle and secondary schools and concern public and private education systems. In each case, methodology had to be adapted to conditions prevailing in the country's educational system and to the statistical data available. Consequently, the techniques proposed cannot lay claim to the universality or scientific exactness with which a hasty reader may feel tempted to endow them. Before taking these techniques as a guide, each country must keep in mind the ideological and political environment in which they will be applied. There must be no misunderstanding on this point: the composition of the case studies' sample results from the actual possibilities available for undertaking research work and in no way reflects ideological preference or any *de facto* discrimination in the way the research work was undertaken.

A summary of the principal conclusions of the investigations will be found in Part A of this work (Chapters I, II, III, IV and V). The first four chapters, with a rapid run-through of the case studies' sample, indicate just how diverse are the fields of application of the school map in educational planning. The reading of these four chapters is not essential to an understanding of the work; the reader may well read the chapter which deals with his particular field of interest and proceed immediately to Chapter V. The summaries provided at the end of each chapter will assist the reader in making his selection.

Chapter V puts forward a number of preliminary conclusions reached in the course of IIEP research work into concrete problems connected with the school map, such as the relationships between education 'supply' and 'demand', the degree of 'realism' of the international aim of universal primary education, the inequalities in schooling conditions in rural areas, etc.

Part B (Chapters VI, VII, VIII, IX and X), dealing with methodology, is of as practical a nature as possible. It has been designed as a working manual for educational planners and administrators. Despite the employment of a few mathematical formulæ, a knowledge of mathematics is in no way necessary for the understanding of this deliberately simple and practical text.

Chapter VI describes the stages of introducing the school map and makes an analysis of the problems connected with staff training and the collection of statistical data, with the part played by a study of a pilot area and the work on national procedure.

Chapter VII contains an introduction to a number of useful concepts, such as those of catchment area, urban and rural perimeters, and standards of one kind and another.

Chapter VIII deals with methods of diagnosing the school map at national and area level, providing an introduction to the procedure of dividing the country up into areas, and examining the technique of indicators and the parameters to be taken into account when diagnosing.

Chapter IX deals with the question of estimating the demand for schooling. It includes a description of a number of techniques for breaking down targets by areas, and for analyzing population movements and investigating requirements over and beyond the period of compulsory education.

Chapter X focuses on methods of drawing up proposals for school localization and the part played by techniques for cost/performance analysis in arriving at decisions.

Finally, by way of conclusion, some indication will be given of possible extensions of the school map.

The criticism directed against school systems does not put in question the necessity of introducing methods to improve organized educational supply. The 'education' map covers a broader field than the school map, but proceeds from the same conceptual basis, namely, a method for the co-ordination of school networks, the regionalization of the goals of the Plan, draft papers to express what the goals mean in terms of local action and the drawing-up of maps. These maps must be the result of a number of successive stages involving authorities at central, regional and local level. The introduction of the school map involves task-sharing and collaboration in two directions, 'vertical', i.e. between authorities and those in charge at central and local levels, and 'horizontal', i.e. between the social groups affected at each level where decisions are taken.

APPENDIX

What the school map is, with examples drawn from a number of countries

What is the school map? That it is difficult to define in a satisfactory manner was demonstrated by an investigation carried out by IIEP in 50 or so countries with a view to surveying the work being done in this field. It very quickly became clear that the meaning of the school map and what is expected of it are not the same everywhere. The following examples may illustrate the point.

In the *southern part of Nigeria* there is a body of legislation which strictly regulates the setting-up of new schools. The authority or person concerned has to make application to the Department of Education by filling in a form indicating how teachers are to be recruited and how the school is to be set up and financed, with descriptive plans of the land and buildings in question; at the same time, an undertaking must be given that the rules and orders regulating the running of schools will be respected.[1]

The dossier justifying creation of new schools will normally include surface standards for the land and premises used, as well as recommendations on furnishing and equipment, but while legal provision is made for avoiding wasted effort (the Education Committee, the body in charge of the school map, may withhold consent 'if there already are adequate premises in the same area where it is proposed to open the school'), there is no national integrated plan for schools' localization to guarantee that the school map will be a rational one. On the other hand, in certain places such as Lagos an attempt is being made to set up a co-ordinated schools network.

In *the Philippines* the *Manual of Regulations for Private Schools* and the *Service Manual for Public Schools* lay down in very general terms the area and floor-space standards for land and premises used; these must be complied with by new State and private schools. Private schools are subject to very flexible rules concerning: (a) location of new premises in the light of fire risk, proximity to roads bearing heavy traffic, hygiene conditions and precautions against weather hazards; (b) the areas of projected sites in the light of enrolments; and (c) the way schools are run and maintained. Experience shows that decisions on where school premises are to be located are taken case by case without any endeavour to co-ordinate at national level. The great majority of primary and secondary schools are concentrated in the most highly-developed parts of the country, to the neglect of rural areas.

In *Japan*, on the other hand, the school map has a more complex meaning. It plays a different rôle from area to area; legally, the municipalities bear responsibility for setting up primary and middle schools, with the result that even the smallest villages have to have at least a primary school and a middle school. The secondary-school map, on the other hand, is in the hands of the regional prefects. With a view to more rationalized school maps, the Ministry of Education is encouraging school mergers and has published a *Guide on School Mergers*. An endeavour to standardize premises is also being made, at least in the case of schools (about one-third of the total) whose expenditures are a charge on the Treasury, and a 'school building guide' has been brought out to this end. Finally, plans have been announced for the integration of the school map with town-planning schemes.

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[1] See for instance *The Education (Lagos) Ordinance*, 1957.

For *New Zealand*, in the words of those working in the Ministry of Education, 'there is no integrated national plan on the setting-up of new schools. This is due to the decentralized character of the schools system and to the degree of autonomy enjoyed by private schools, which may be set up without any approach to the government apart from getting general consent.' In the case of primary schooling each school district, of which there are ten, makes an estimate on empirical lines of its requirements in the matter of new schools and negotiates with the Department of Education in respect of financing. Though secondary education comes directly under the Ministry, the examining of dossiers on the setting-up of schools is entrusted to the local authorities.

In *Denmark* three school systems—State schools, schools run by local authorities and private institutions—exist side by side. Because of this there is no programming of the primary- and middle-school map at national level, or at school-district level. However, after the municipal reforms brought in in 1970, it was decided to introduce planning at district level in the matter of locating schools, but it is still too soon to form an idea of what has been achieved in this regard. As against this, the secondary-school map has been the subject of planning endeavours at national level based on the prospects for increased enrolment; a card-index for schools, the *Skoleregister*, was put together in 1970/71; this provides essential information on each school. An official study is being devoted to planning the nationwide school map for gymnasium-type schools[1] up to 1985.

One consequence of the vast extent of both the *USA* and *Canada* is that each Province or State retains its autonomy in the matter of education and in particular controls the planning of the provision of school buildings. Details may vary from region to region, but the procedure is roughly the same everywhere. Both countries are divided up into school districts, each with a school board, and it is this school board which:

> 'lays down general policies to be followed on where the building is to be located or on the remodelling of an existing building; approves the teaching scheme, this being the document which gives voice to preoccupations of a pedagogic nature; and authorises the taking-on of a school-establishment specialist-consultant and selects the architect for the job.'[2]

Thus, it is probable that as a result of the decentralized structure of education in North America, there are coherent school maps for each district. On the other hand, in the case of the Province or State, not to speak of the country as a whole, there is no certainty that a coherent schools network is being created under the current procedure. In fact, some local authorities find it impossible to underwrite the expansion of their education systems to take care of expansion in numbers or the demands of modern pedagogy and therefore the State or Provincial governments have adopted a 50–50 system as a basis for subsidizing school building. However, even if this procedure has made it possible to level out to some extent inequalities prevailing in different districts, one cannot really speak of a homogeneous school map at State and Provincial level.

In *France*, on the other hand, a centralized structure is in operation and the school map reflects the complete State schools network throughout the country. The school map was decided on by the Ministry of National Education on the basis of proposals from the heads of schools-inspectorate areas after consultation with the competent committees in each of those areas; it provides a means of forecasting whereby the creation of new schools and the transformation of others can be programmed. A simple and uniform method is in force for the drawing-up of the school map, which was introduced in 1963 for first-cycle second-level education and in 1965 for the second cycle. It comprises three main phases: (1) dividing the country up into school sectors and districts, these being the catchment areas for first- and second-cycle schools; (2) calculating the numbers of those to be given schooling in each geographical area; (3) forecasting furnishings and equipment in the light of forecasts of enrolments and of existing school structures, furnishings and equipment.[1]

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[1] Source: 'Gymnasiebehovet 1985' by K. Autonsen, O. Dauneskiold-Sanze, 1968, Statenstrykeningskontor, UN 00–460.

[2] A. Gaudet, 'Le spécialiste en aménagement scolaire', in *Education et Gestion*, No. 35, March 1973.

The application of industrial processes to the production of furnishings and equipment has also made it possible to have standardized premises throughout the country.

In *Bulgaria* work on the school map is based on the following principles:

(1) *The principle of democratization*. The school network is organized in such a way as to afford every young Bulgarian the possibility of getting schooling, irrespective of his or her social or ethnic origin.

(2) *The principle of 'regularity'*. The distribution of schools in each region must be such as to make it possible for all pupils to reach them easily.

(3) *The unity principle*, guaranteeing a unified micro-regional, area, regional and national school map.

(4) *The principle of 'management'*. School-map structure must be managed in conformity with administrative standards and comply with the demands of modern teaching practice.

(5) *The principle of classified spheres of activity*. The areas served by higher-level schools embrace areas served by lower-level schools.

Finally, in conformity with the 'basic guidelines for the public service system in the People's Republic of Bulgaria', approved by the Council of State in 1972, the education service is integrated with all public services.

In *Poland*, on the other hand, work on the school map, which is done in each region, is inspired by the following considerations:

(1) Progressive setting-up of schools in centres where local communities have been enlarged as a result of the creation of larger administrative units. This creates a need for a school-transport system and nuclearization. Such a system is already operative in half the communities. It is planned to reduce the total number of schools from 25,000 to 17,000.

(2) The introduction of such a system should lead to the elimination of differences between schooling in towns and cities, and in country districts, that is to say it should result in a broader application of the principle of democratization.

(3) In 1978 the reform of the educational system, calling for all young people, as a universal and compulsory measure, to be taught in second-level (10-year) school, will be put into effect. Moreover, this is the object of the changes being introduced in first-level collective schools.

(4) Using the setting-up of the network of central eight-year schools as a guideline and bearing in mind the work being done to facilitate the reform of the education system, all the *voivodie* (and municipal) school authorities drew up the new school map in 1974. The research centres dealing with the planning of the school network also took part in this work.

(5) It is accepted that the ten-year schools will have at least three sections of the IXth and Xth classes (exceptionally two). The number of pupils in satellite schools is not to be lower than 20 and in 1990 not lower than 30. The number of pupils per class is not to exceed 25 and the number of pupils per school may vary from 400 to 1,000.

(6) In the light of the ten-year schools, and in accordance with the requirements of the national economy, decisions will be made for the network of vocational schools (after

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1. See: Commissariat-General for Planning Public Amenities and Facilities and Productivity, *Vth Plan, 1966–70*, General Report of the Committee on Equipment for School and University purposes and sporting facilities, Annex.

the ten-year school), particularly in the larger built-up areas where education will be given for a number of similar trades. The vocational schools are also to serve as centres for permanent adult education. The number of pupils in the vocational schools is not to exceed 1,500 (excluding the adults receiving permanent education).

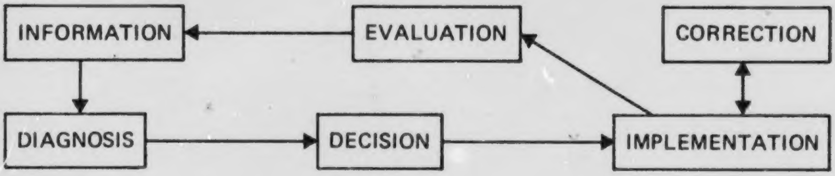
PART A

A synthesis of school-map pilot studies

Experience is the best teacher: IIEP's series of pilot studies made in a dozen countries has made it possible to devise a school-map methodology and put it to the test. One aim of these studies has been to show how very diverse are the fields of application of school-map techniques and to assess the possibilities of making use of these techniques in conditions that are more favourable or less so. Irrespective of whether or not adequate statistical data were available, and regardless of whether or not educational planning was being used as an instrument of education policy, it has proved possible, thanks to the use of the map methodology, to deal with problems as varied as (a) assessing the effects of a decline in the numbers of school-age children as a result of a successful birth-control programme or a decrease in regional population; (b) weighing the realism of decisions taken to raise the school-leaving age; (c) listing the factors affecting the introduction of structural reforms for school systems; (d) establishing the possibilities of universal primary schooling in rural areas with very scattered population and determining the obstacles in the way of rationalizing educational supply in town areas where land is a rare and very expensive commodity; (e) pinpointing the advantages and difficulties of integrating the school map with rural planning schemes; (f) regulating the co-existence of state and private school systems and bringing in a school map such as will make more effective use of the education sector's resources, etc. In this part of the work, we set out to present the fourteen case studies from which the methodology put forward in this work has sprung. Chapter I shows the practice in connection with the school map in three countries, the USSR, Sri Lanka and Morocco, with an emphasis on methodological aspects. Chapter II shows how the school map makes it possible to find out how realistic the targets of education plans actually are; Chapter III speaks of what can be expected of the school map when it comes to devising and introducing reform programmes for school systems; Chapter IV provides examples of how the school map can be applied so as to obtain more effective use of educational resources; and Chapter V sets out the main conclusions drawn from the sample of pilot studies.

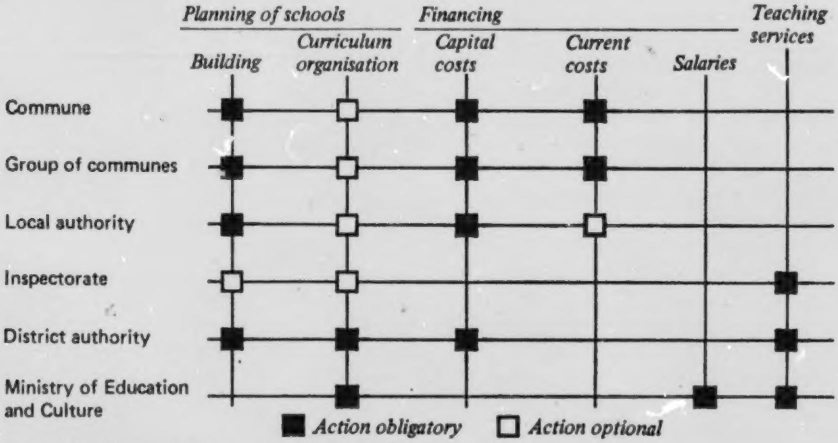
However, before presenting each case study independently, it may be of interest to indicate, by these examples, how the various countries' experience can be classified as far as concerns the rôle of the school map in the decision-taking process and in the planning of education.

In the first place, it should be noted that the classic model shown below cannot be applied to any of the countries studied.



The 'correction' and 'evaluation' stages, and the links between the stages, are not usually found in the decision-taking procedures we have encountered, and apart from exceptional cases (such as that of the Indian Education Commission in 1964) no national experience can be classified in terms of a 'linked' model of the type illustrated.

Secondly, as a result of the large number of decision centres involved in school organization, and the diversity of seats of responsibility, depending on level and type of education, in various countries (Figure 5 for the Federal Republic of Germany is typical in this respect), the range of procedures found in the countries studied cannot be presented in one table without either sacrificing precision or simplifying the criteria for classification.



	Planning of schools		*Financing*			*Teaching services*
	Building	*Curriculum organisation*	*Capital costs*	*Current costs*	*Salaries*	
Commune	■	☐	■	■		
Group of communes	■	☐	■	■		
Local authority	■	☐	■	☐		
Inspectorate	☐	☐				■
District authority	■	■	■			■
Ministry of Education and Culture		■			■	■

■ *Action obligatory* ☐ *Action optional*

FIGURE 5. *Educational administration in the Federal Republic of Germany.*

It is for this reason that the table which follows arranges the facts as seen in the countries dealt with according to a number of (incomplete) criteria. It will be seen that in general the Ministry of Education seems to enjoy a quasi-monopoly in the matter of information. But the taking of decisions and their implementation rests, as the case may be, with individual initiative, with local authorities, with parents' associations, with departments of the Ministry of Education, the Ministry of Planning, or even the Ministry of Transport!

Classification of school mapping procedures in the countries studied

Country	*Information*	*Decision*	*Implementation*	*Type of decision*
USSR	Ministry of Education, the Party, town and district officials	Specialised groups (Planning Commission and Ministry of Education Officials)	Local authorities	Discussed, considered, and decreed according to type
Sri Lanka	Ministry of Education	Ministry of Education and local groups	Ministry of Education	Forced (at best negotiated)
Morocco (secondary)	Regional planning services and Inspectorate	Central School Mapping Service Central School Mapping Service	Supplies, Administration and Personnel Services	Decreed (sometimes considered)
Uganda	Ministry of Education	Pupils' parents, voluntary organisations and foreign missions	As for *Decision* plus local authorities	Forced
Ivory Coast	Ministry of Education, Inspectorate, Departmental School Map Commissions	National School Map Commission	Departmental authorities and pupils' parents	Discussed, often forced
Costa Rica	Planning Office, Ministry of Education	Ministries of Education and Transport	Ministry of Transport	Forced
Federal Republic of Germany	Ministry of Education and the Commune	As for *Information*	Communes	All kinds of decisions
Iran	Ministry of Education	Ministry of Education and Planning Organisation	Regional educational councils Cantons, Ministry of Education	Decreed or forced
Nepal	Ministry of Education	Town and village panchayats	District education office	Decreed or forced
Ireland	Ministry of Education	Ministry of Education (local representative)	Ministry of Education (local representative)	Discussed or forced
Lebanon	Ministry of Education	Unco-ordinated initiatives	Ministry of Education and various local groups	Decreed or forced

By and large—that is, in nine countries out of eleven—the decisions we see taken are 'forced' as a result of pressure from the users or from other groups of locally interested people. This makes it very difficult to ensure a minimum of rationality in the process of decision-taking. In actual fact the decisive factor is political, since, whatever the source of the decision taken, the government can always in one way or another exercise a measure of control and restrict the freedom of irregular initiatives; it can refuse to recognize an institution, block its operational subsidy, or take any other measures that may lead to the closing-down of a school opened without its consent. In practice, of course, the position is not so straightforward: the government cannot simply defy the wishes of the population. In the task of striking a balance between what is nationally and what is regionally regarded as 'publicly useful' lies the really significant rôle of the school map.

I. Practices in a number of countries in connection with the school map

This chapter will deal with what is being done in three countries widely different in level of economic development and in political and school systems; namely the USSR, which can look back on more than half a century of educational planning, Sri Lanka which, contrary to most of the countries of the Third World, had almost achieved universal primary education at the beginning of the sixties, and Morocco, where expansion of the school system really got under way only when the country attained independence.

1. The USSR: 'the school map with facets'

From the moment they came to power, the Soviet authorities felt the need to set out the basic principles of the school map in relation to the aim of universal education. In the resolution passed at the first governmental conference of statesmen[1] they examined the question of dividing the country up into districts, defining the school catchment area, bringing in the school district, etc. Much later, when compulsory eight-year education was brought in in 1956, an extensive effort was made to improve the school map. In recent years, with the transition to complete (ten-year) secondary education, very detailed investigations have been made with a view to improving the school network in the RSFSR, Ukraine, Lithuania, Tadjikistan, Krigizia and a number of other republics.

These investigations, the results of which would apply on a nation-wide scale, were all carried out on approximately the same lines. In a first stage, a set of data and information was compiled:

(a) district maps and town and city plans;
(b) distribution of productive forces and possibilities of expanding them;
(c) level of economic development of *kolkhozes*, *sovkhozes* and other bodies; the assistance they can give in establishing the school network;
(d) a planning scheme at district level, ratified by the controlling authorities;
(e) a list of schools for general education with prospective plans for the expansion of national education;

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[1] See Statistics of the Ministry of National Education issued 15–21 March 1919 (Moscow) and the decree of the RSFSR Central Executive Committee and Sovnarkom dated 31 August 1925 on the introduction of general elementary education and the setting-up of the school network.

(f) rates of promotion from eighth to ninth class by education streams, etc.

Next, an examination was made of demographic trends over the past five years with a view to identifying school enrolment prospects. The estimates dealt with the population as a whole by region and district but a distinction was made between urban and rural populations; they also covered natural and mechanical growth of the population, and gave a breakdown of the number of inhabitants by age up to 18 and by district and rural area, etc.

The third stage was taken up with the work of projection. Estimates of school enrolments are made under two methods, a so-called 'direct-calculation' method and a method of 'calculation by thousand inhabitants'. The first of these methods makes use of rates of admission, repeats, expulsions, promotions, absenteeism, etc. This is a procedure which is considered too burdensome, since estimates by micro-district in the RSFSR require five to six months of calculation. However, it is expected that matters will be simplified with the introduction of computer programming. The second method is of much more general application, being used, for instance, by planning authorities for school buildings; estimates of educational requirements in the years to come can be made provided the number of schoolchildren and the total population of a given territory are known and a number of assumptions (regarding population movements, mortality rates and the percentages of physically and mentally handicapped children) are taken into consideration.

In a fourth stage attention was given to the possibilities of introducing the prospective school map. To do this effectively, a number of principles must be adhered to:

(1) The organization of the scheme for the distribution of the school network has to be based on the existing network of schools. It should be done separately for elementary, secondary and eight-year schools.

(2) The streaming of elementary-school children to other schools to continue their education has to be specified, and the distance from home to the new school stated.

(3) Account needs to be taken of geographical conditions and their repercussions on the map. In particular, maximum distances for children from home to school depend on topology; in the steppes, children in higher classes may attend schools three kms. away but in mountainous areas this distance has to be cut in half. Although a school-bus service often constitutes a better solution than that of boarding facilities, the situation may require the setting-up of boarding schools.[1]

(4) The distribution of schools has to reflect the breakdown of the population by national groups. The constitution of the USSR gives each child the right to receive education in his or her maternal language and in practice this right is afforded in proportion to the number of children of school age. In Lithuania, for instance, schooling is given in three languages; Lithuanian, Russian and Polish (with 7 variants).

(5) Among the possible solutions the double-shift system, which seems to give unsatisfactory results, is to be avoided.

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1. As a rule the maximum distance from home to school for children in classes I–III is 1.5 kms. and for children in classes IV–X it is 2 kms.

(6) When district school networks are being organized, care must be taken not to establish schools with small enrolment numbers (the normal enrolment per class is 35 to 40). The question is a particularly complicated one in eight-year or secondary schools, where the timetable is such[1] that the possibility of having a full-time (18 hours) professor per subject is limited. More than half the school subjects are taught by persons teaching more than one subject in eight-year schools.

'Model projects' for school buildings come in a number of variants according to the regions in which they are to be used. Those in charge of national education in the Moscow urban district have opted for a secondary school with 1,000 to 1,300 places, and abandoned the large-scale schools with 2,000 places and more, which lead to management and operating difficulties. Those in charge in Latvia and Estonia also prefer schools with 1,000 places, while those in Gorki region opt for a similar solution, the 1,200-place school. As against this, in the towns of Lithuania there is a preference for schools with 1,712 to 1,920 places.

The average number of pupils per school varies greatly from one republic to another; for elementary schools, the average is 28.1 pupils in Lithuania, 25.2 in Estonia, 30.4 in the RSFSR and 68.8 in Kirgizia; in the eight-year school, the average is 144.6 pupils in Georgia, 235.2 in the RSFSR and 285 in Moldavia; in secondary schools, the average is 192 in Estonia, but 513.7 in Georgia.

Fifthly, the work was executed by specialized working parties set up for this purpose, with a membership consisting of representatives of regional and district Plan Boards, calling on the assistance of those working in the Ministry of National Education and of the Party. In considering proposals for school distribution, the regional working parties or boards work in close collaboration with the departments and with district and town directors of education. The latter provide detailed information on the existing networks and can help throw light on other problems connected with planning, the building of schools and their infrastructures. Meetings are organized with the chairmen and vice-chairmen of district and town executive committees, secretaries of party committees dealing with education, the first secretaries of the committees, the district chairmen of the Plan Board, architects, building engineers, those in charge of transport departments, inspectors of the central building department, chairmen of *kolkhoze* rural councils, managers of *sovkhozes* and other people in charge at district level. In other words, this is a procedure that calls for direct participation, voicing of opinion or provision of information on the part of almost all representative authorities at town or district level.

The report on what is being done in the USSR in connection with the school map[2] deals with these various aspects and speaks of the main problems at present facing Soviet planners in relation to the organization of education supply. Overall, these problems fall into three categories:

(a) improving the results of teaching and pupils' results by gradually eliminating small schools and increasing the number of qualified teachers;

(b) consolidating the schooling infrastructure, taking account of the transfer of

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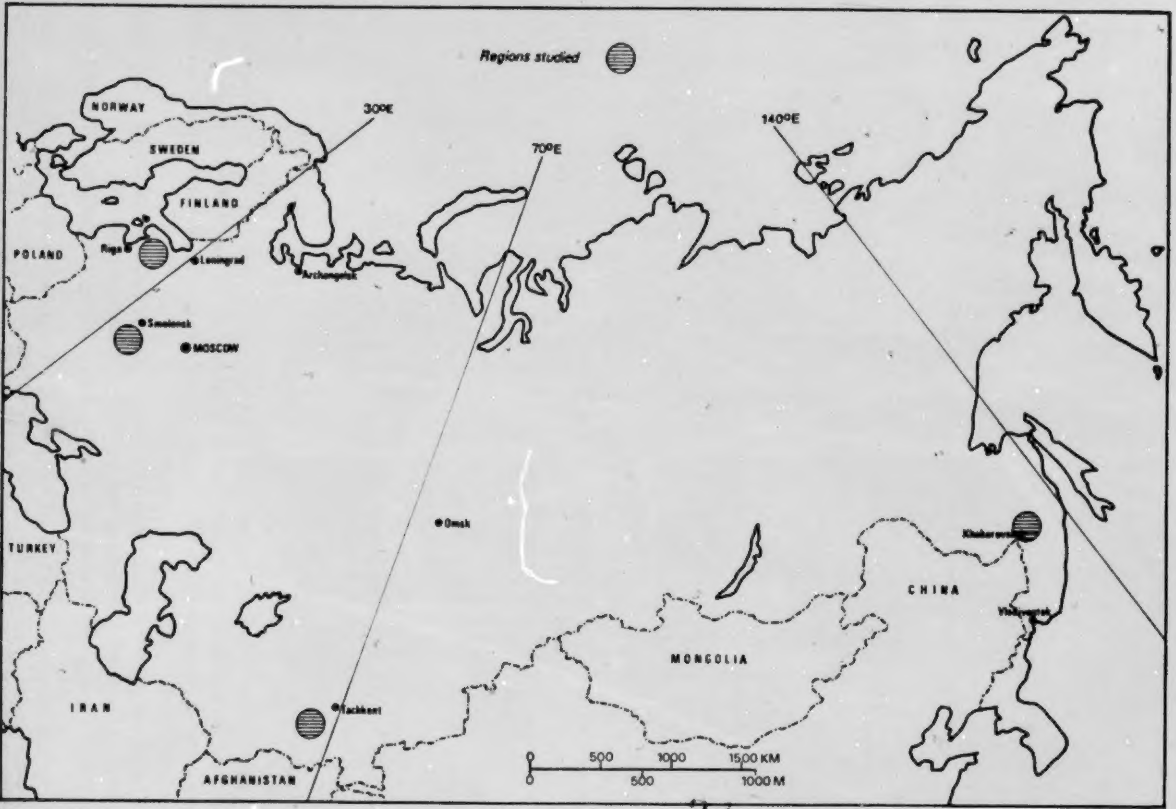
[1] Nine hours for history, 10 hours for geography, 7 hours for chemistry, 8 hours for biology, 8 hours for foreign languages, 8 hours for physical culture and 8 hours for vocational training.

[2] V. A. Jamine, S. L. Konstaniane, K. G. Nojko, V. N. Oussanov, *The distribution of schools of general education in the USSR*, Paris, IIEP (in preparation).


Regions studied
NORWAY
SWEDEN
FINLAND
POLAND
Riga
Leningrad
Archangelsk
Smolensk
MOSCOW
30°E
70°E
140°E
TURKEY
IRAN
AFGHANISTAN
Tashkent
Omsk
MONGOLIA
CHINA
Khabarovsk
Vladivostok
0 500 1000 1500 KM
0 500 1000 M

MAP 1. *The regions studied in the USSR.*

the four-year school to eight-year schools, the more rapid increase in the population of towns and cities with consequent decline in rural population and the need to gradually eliminate elementary and eight-year schools which no longer meet the country's present requirements (in the last five years 19,900 primary schools and 8,600 eight-year schools have been closed down);

(c) preparatory work for the transition to general secondary education and measures to put an end to the 'chronic backwardness' of schools in country districts.

After setting out the basic principles and the methods for the rationalization of the general-education schools network, the report provides four examples of the application of the school-map method in various parts of the USSR, namely the Lake Serebirare district in the Moscow area, the Tuarag and Kaichodoris districts in the Lithuanian SSR, the 'October' district in the coastal area and the Regar district in the Tadjikistan SSR (see Map 1). In the Serebirare district, 200 kms. from Moscow, 29 out of 37 existing schools will be closed within ten years. The Tuarag and Kaichodoris districts have relatively new networks, dating from after the war (1939–45); the schools are relatively well-equipped but, in view of population decline (Kaichodoris) and the distances between elementary schools and eight-year or secondary schools (Tuarag), 50 to 55 per cent of the schools will have to be closed down before 1980 and the school bus service expanded. The 'October' district has seen considerable changes in recent years; the standard of living of local people has considerably improved, the distances between home and school have been reduced, new small towns have been built, the road network has been improved and inhabited areas enjoy regular services. The school district may be as much as 10 to 12 kms., as against a maximum of 3 kms. a few years ago; there is, therefore, very considerable scope for rationalizing the school network. The Regar district measures 117,450 sq. kms. as against 876 sq. kms. in the case of the Serebirare district; its population density is so low, at 0.78, that unless the inhabitants are first brought together in the larger villages any rational organization of the network of elementary and eight-year schools will prove difficult. Both the considerable range of varying situations in these districts and the scope of expected change in school networks testify to the nationwide application of the school map in the Soviet Union and the flexibility of the techniques employed.

2. Sri Lanka: an attempted evaluation

The report on Sri Lanka is in effect a retrospective analysis of a policy for the reorganization of the school map that was put into effect ten years or so ago.

In this field, as in many others[1], Sri Lanka has had a pioneering rôle; as early as 1960–61 it decided on the unification of its school system and the rationalization of all the State-aided private sector. Implementing this decision called for a revision of the school map throughout the country, a revision easier to decide on than to carry out, as was noted at the time by the authors of the present report, who were closely concerned in what was being done. In addition to the foreseeable

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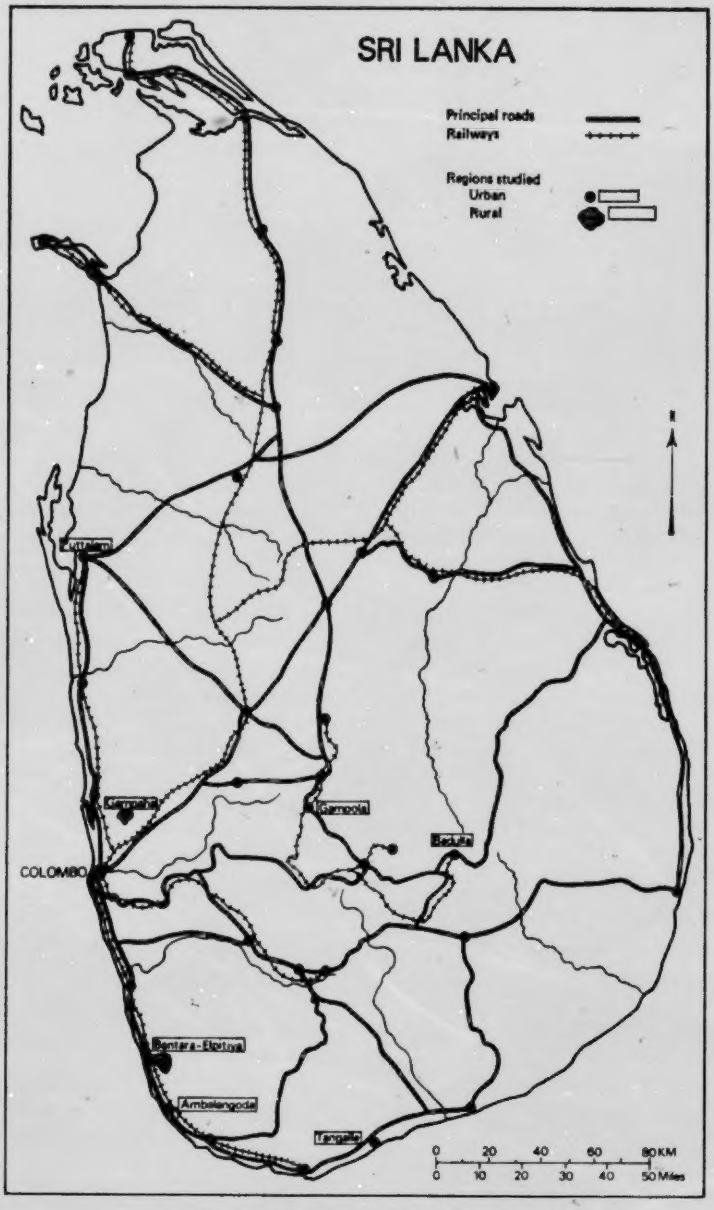
[1] See 'Costing first and second level general education', in *Educational cost analysis in action: case studies for planners—I*, Paris, Unesco/IIEP, 1972; and Jacques Hallak, *Financing and educational policy in Sri Lanka* (Ceylon), Paris, Unesco/IIEP, 1972.


SRI LANKA
Principal roads
Railways
Regions studied
Urban
Rural
N
Puttalam
Gampaha
Gampola
Badulla
COLOMBO
Bentara-Elpitiya
Ambalangoda
Tangalle
0 20 40 60 80 KM
0 10 20 30 40 50 Miles

MAP 2. *The regions studied in Sri Lanka.*

difficulties arising out of the resistance offered by the private schools and the religious bodies managing them, other problems arose in the shape of the several languages used in the schools and the fact that a number of minority ethnical communities are resentful of any measure that might limit their autonomies or tend to blot out their specific characters.

The necessary legislation was put through, though not without difficulty, and the administrative organization was set up to unify the educational system; in 1965 Sri Lanka succeeded in 'nationalizing' the private sector and in empirically drawing a school map reflecting as closely as possible the Government's aims and conciliating the wishes of the parents so far as this could be done. Eight years later, with the Minister of Education of the reform period again in power, the Government agreed to co-operate with IIEP in having a look at what had been done and to check to what extent the measures introduced for the reorganization of the school map some ten years previously had been implemented.[1]

Unfortunately, most of the statistical data needed for an assessment of this nature are unavailable, since neither the Ministry nor the schools envisaged this investigation. It was necessary, therefore, to carry out as representative as possible a retrospective investigation in order to complete the basic information. In addition, the authors drew on their knowledge of local conditions in an attempt at retracing the history of the experiment. Seven areas were selected in various parts of the country as typifying the linguistic, ethnic and religious diversity, and the varying levels of urbanization (see Map 2). Each of the areas has been covered by a monographic study comprising: (a) a description of the school network as it was in 1960–62; (b) a diagnosis of the principal shortcomings of the system; (c) an examination of the compromise solutions adopted after negotiations with local communities; and (d) an analysis of the political, sociological, cultural and religious factors that have hampered the taking of rational decisions.

In addition, it was intended that each case study should convey an idea of the effects, in terms of costs and advantages, of the measures taken for the reorganization of the school network. This made it necessary to compare as systematically as possible the way schools were run before, and after, reorganization, as well as to obtain and assess the opinions of local people on the advantages and disadvantages of what had been done. (An example of such an enquiry will be found in Table 1.) The comparison made it possible to round off each monograph with alternative and more effective proposals for reorganization than those previously decided on.

The evaluation findings cover the techniques employed for the rationalization of the school map, the steps taken for putting it into effect, and the obstacles encountered. The authors make the point that if there had been a more systematic approach to the task of preparing the school map and all the communities affected had been brought into association, much better results would have been achieved. 'The methodology used for reorganization is lop-sided and inadequate'; the report concludes by saying that the Sri Lanka experiment is to be regarded as partially satisfactory.

So far as concerns other countries, a further conclusion emerges, namely that while the school map is being put into effect there must also be a concomitant

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[1] A. Guruge (with K. D. Ariyadasa), *Planning the location of schools: Sri Lanka*, Paris, IIEP, 1977.

TABLE 1. Comparison of education effort in 1960–70 with that of 1950–60

	Yes	No	No comment
Do you consider that our educational efforts have shown an improvement?	52	32	5
Do you consider that there has been better planning in the provision of educational facilities in the area?	55	30	4
Has reorganization resulted in promoting closer and more harmonious relations among pupils and parents of:			
(a) different social classes?	54	27	8
(b) different religious denominations?	21	14	54
(c) different races?	20	14	55
Did the creation of co-educational schools result in			
(a) better discipline?	15	18	56
(b) the provision of fuller curricular offerings suited to the sexes?	15	18	56

process of evaluation which allows continuous study of progress accomplished and of the adjustments needed in any policy on the reorganization of school networks.

3. Morocco: from the preparatory work for the beginning of the school year to the second-level school map

What is being done in Morocco in connection with the second-level school map is limited to two aspects, namely (a) the preparatory work for the beginning of the school year, and (b) the programming of furnishings and equipment.[1]

(a) Up to 1965, the preparatory work for the beginning of the school year was done by a board comprising all the headmasters in the country, the Director of Education, inspectors concerned with different specializations, those in charge of furnishings, equipment and staff matters, and the official responsible for the school map. In practice, the board's work took the restricted shape of a dialogue between the last-named official and the headmasters. Taking into account the repeaters and those about to be promoted, it was possible to estimate how many new pupils could be taken in in each school, and the problems arising were resolved, case by case, as they arose. There was no synthesizing operation and, apart from the official responsible for the school map, no one had an overall view of the situation. As a result of the rapid increase in secondary-school enrolments between 1964/65 and 1969/70 the methods used had to be improved, and from 1965/66 on it became necessary to apportion the preparatory work for the beginning of the school year to regional committees set up and chaired by 'delegates' and reinforced by the technical support of the head of the planning bureau, who was locally in charge of school-map affairs. The machinery remained the same, but the work itself was now divided up among twelve regional officials instead of being simply handed over to the individual responsible, for whom meeting all the headmasters separately was no longer a feasible undertaking. None the less, he did manage to

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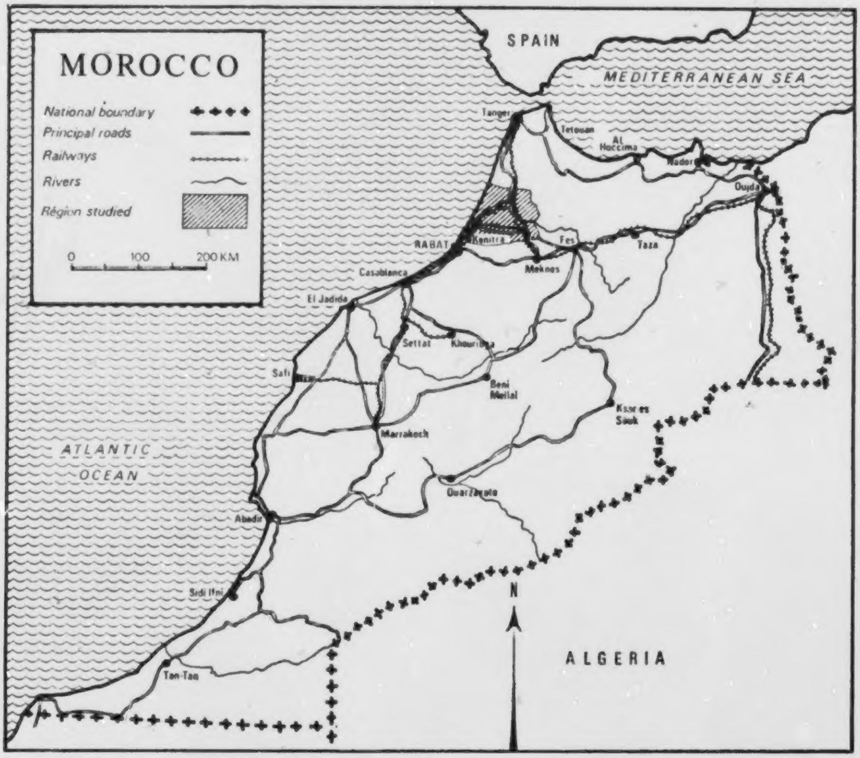
[1] R. Bernard and J. Poncharal, 'La carte scolaire de l'enseignement secondaire au Maroc', in G. Porte, R. Boudet, A. Badou, J. Hallak, R. Bernard and J. Poncharal, *Méthode de préparation de la carte scolaire: Casablanca, le Gharb et Kénitra*, Paris, IIPE, 1976.


MOROCCO
National boundary
Principal roads
Railways
Rivers
Région studied
0
100
200 KM
SPAIN
MEDITERRANEAN SEA
Tanger
Tetouan
Al Hoceima
Nador
Oujda
Kénitra
RABAT
Fes
Taza
Meknes
Casablanca
El Jadida
Settat
Khouribga
Safi
Beni Mellal
Ksar es Souk
Marrakech
ATLANTIC OCEAN
Ouarzazate
Agadir
Sidi Ifni
Tan-Tan
N
ALGERIA

MAP 3. *Morocco, showing the province of Kénitra.*

convene the heads of the planning bureaux and went over their work with them, without, however, being able to resolve some of the problems they faced because he had no nationally standardized methods or documentation. In 1969/70 a procedure was devised by the central school-map department under the planning directorate of the Ministry of Education.[1]

The procedure has reference to the work of:

the regional planning departments which carry out the preliminary studies for their areas and maintain contact with headmasters; the planning inspectorate which controls the work of the regional planning departments and is responsible for liaison with the central school-map department;

the pedagogic inspectorates which give their opinion on proposed setting-up, closing-down or transfer of sections; the works department which supplies information on building projects in hand and sees to it that directives on the carrying-out of projects are complied with;

the operations department which is in charge of the distribution of pedagogic and boarding-school supplies needed for the beginning of the school year;

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[1] The Ministry for Culture, Basic Education and Higher and Secondary Education.

the personnel department which centralizes the staffing requirements of schools and looks after recruitment and appointments.

Tables have been devised to standardize the way information is presented and also the method of working. They cover enrolment forecasts school by school, the definition of catchment for admission to second level, forecasts of orientation in the second cycle and information on boarding schools. In view of their methodological interest, copies of these tables will be found annexed to this chapter.

(b) Methods of programming furnishings and equipment have evolved along the same lines. Up to 1966, a ministerial commission travelled through the region each December meeting those in charge locally, so as to determine building requirements for the beginning of the following year. Because of the increase in enrolments, the procedure was abandoned and the overseeing of building programmes was entrusted to the heads of planning bureaux, who at some point in April were required to send to central administration a statement of their requirements. On the strength of these statements, the official in charge of the school map distributed the total vote in proportion to each region's requirements and following across-the-board adjustments; the disadvantage of the allocation system was that there was no way of checking whether certain statements were underestimations or exaggerations, since central administration lacked exact papers to justify the regional requests. In 1970 a procedure was devised to remedy some of these difficulties and to ensure that better use was made of available funds (see Figure 6). It consists of (1) establishing a relay-point between the regional planning departments and central administration; and (2) guaranteeing consistency as between furnishings and equipment programming and the forecasts of the Five-Year Plan.

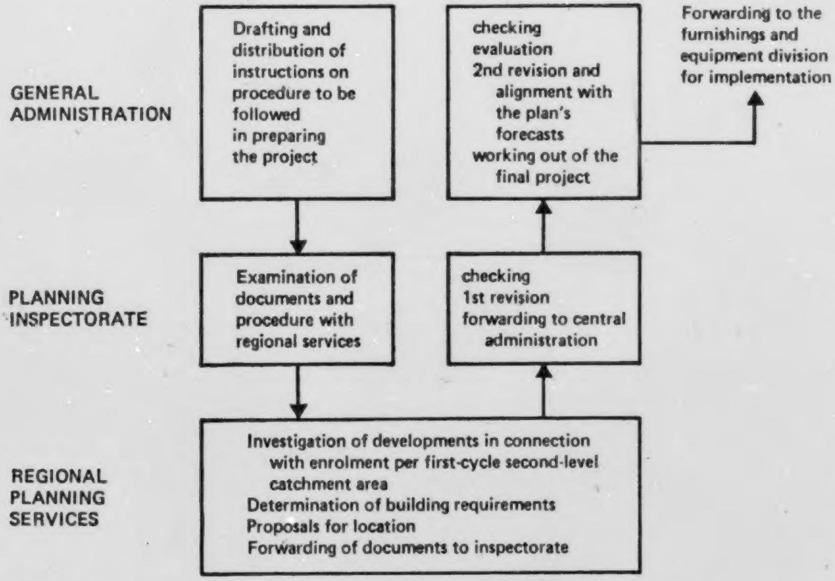
GENERAL ADMINISTRATION
Drafting and distribution of instructions on procedure to be followed in preparing the project
checking
evaluation
2nd revision and alignment with the plan's forecasts
working out of the final project
Forwarding to the furnishings and equipment division for implementation
PLANNING INSPECTORATE
Examination of documents and procedure with regional services
checking
1st revision
forwarding to central administration
REGIONAL PLANNING SERVICES
Investigation of developments in connection with enrolment per first-cycle second-level catchment area
Determination of building requirements
Proposals for location
Forwarding of documents to inspectorate

FIGURE 6. *General diagram of circuit for elaboration of a building project*

The report does not simply set out ways of preparing for the opening of the school year and of programming furnishings and equipment; it also shows how these methods are specifically applied in one area of Morocco, the province of Kénitra. This province has twelve first-cycle schools and six schools providing second-cycle education. Questions connected with girls' schooling, orientation at the second-cycle stage, the use to be made of boarding schools, and costs, are successively examined and provide a clear illustration of the methods followed in drawing up the school map in the short term (two years).

Insofar as methods for drawing up the medium- and long-term secondary school map are concerned, the Moroccan experience has been more fruitful in the realm of theory than in that of practical achievement. In the words of the authors of this study, work on the school map 'will have to go beyond the stage of short-term building programming and facilitate the setting-up of a network of schools such as to make it possible to realize all the aims connected with orientation'. It is within this framework that a number of initiatives have recently been taken by those in charge of school-map affairs in Morocco. They provide for:

(a) establishing of a secondary-schools card-index making it possible to determine the exact structure of existing schools and the nature of the changes they will undergo in the next few years;

(b) drawing-up of criteria to make it possible to delineate 'stable' first-cycle catchment sectors with furnishings and equipment proportionate to numbers enrolled in CM2s[1] and consonant with the schooling policy for secondary education written into the plan for educational expansion at present in force;

(c) standardization of second-cycle catchment areas in relation to schools' present pedagogic structures and present admission targets for the various optional courses approved by the plan;

(d) adoption of a mechanical recording system for preparatory information relative to the opening of the school year, thereby making it possible to institute a systematic country-wide analysis of the various policies on recruitment and the consequences they have for the school map.

All in all, a great deal is being done by Morocco both to rationalize its secondary-school map and, by empirical means, to devise more appropriate methods for dealing with problems encountered in the provision of second-level education. The work that has been going on for the last ten years or so, and that is still in progress, constitutes an experiment of great interest to other countries anxious to start out on the same road.

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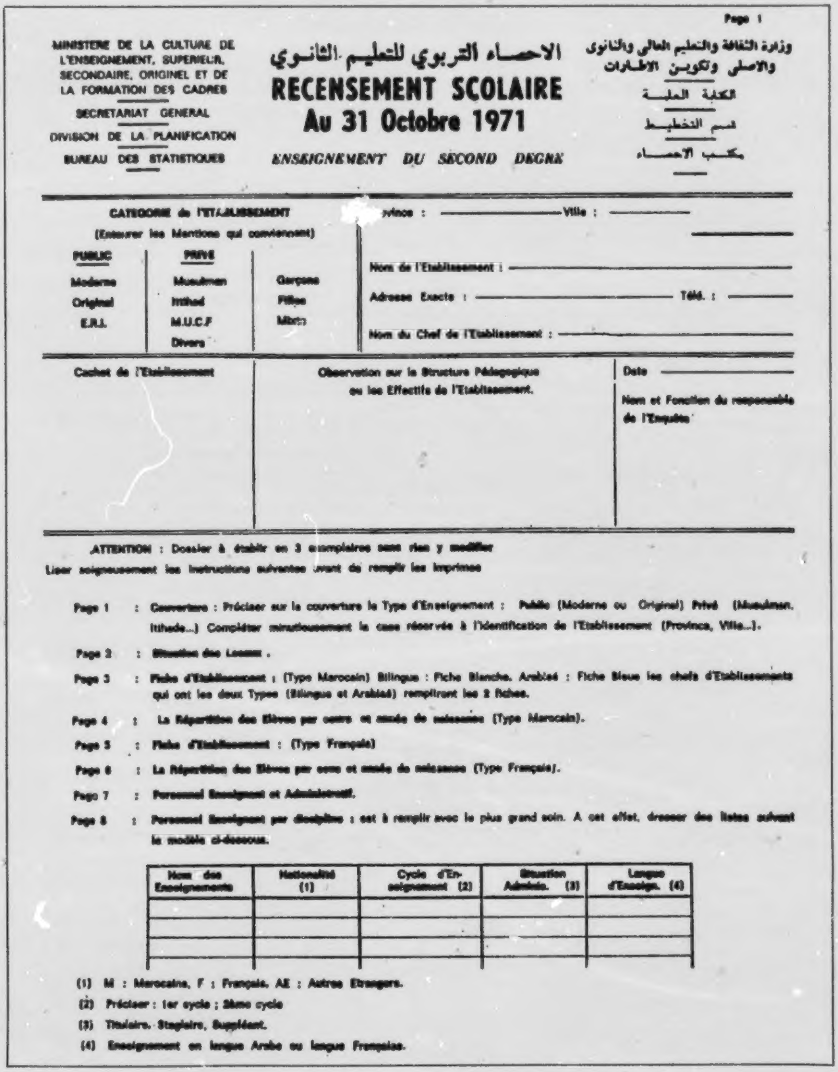
[1] Second year of middle course, i.e. final primary-school year.

From the moment they came to power, the Soviet authorities felt the need to set out the basic principles of the school map in relation to the aim of universal education. Much later, when compulsory 8-year education was brought in in 1956, an extensive effort was made to improve the school map. In recent years, with the transition to complete (10-year) secondary education, very detailed investigations have been made with a view to improving the school network.

Among the poorer countries, Sri Lanka was one of the first to set up a rational network of schools: as early as 1960–61 it decided on the unification of its school system and a revision of the school map throughout the country. The evaluation of this experience in a series of monographs dealing with representative areas shows the difficulties that were encountered and recommends a more systematic approach to the reorganization of school networks.

What is being done in Morocco in connection with the second-level school map is limited to two aspects: the preparatory work for the beginning of each school year, and the programming of furnishings and equipment. Nevertheless, Morocco is making considerable efforts to devise, by empirical means, more comprehensive and appropriate methods to solve the problems encountered in the provision of second-level education.

APPENDIX: Information tables, Morocco



Page 1

MINISTERE DE LA CULTURE DE
L'ENSEIGNEMENT, SUPERIEUR,
SECONDAIRE, ORIGINEL ET DE
LA FORMATION DES CADRES
SECRETARIAT GENERAL
DIVISION DE LA PLANIFICATION
BUREAU DES STATISTIQUES

الاحصـــاء التربوي للتعليـم الثانـوي
RECENSEMENT SCOLAIRE
Au 31 Octobre 1971
ENSEIGNEMENT DU SECOND DEGRE

وزارة الثقافة والتعليم العالي والثانوي
والاصلي وتكويـن الاطـارات
الكتابة العامـة
قسم التخطيـط
مكتـب الاحصـاء

CATEGORIE de l'ETABLISSEMENT
(Entourer les Mentions qui conviennent)

PUBLIC	**PRIVE**	
Moderne	Musulman	Garçons
Original	Itthad	Filles
E.R.I.	M.U.C.F	Mixte
	Divers	

Province : —————— Ville : ——————

Nom de l'Etablissement : ——————

Adresse Exacte : —————— Téléph. : ——————

Nom du Chef de l'Etablissement : ——————

Cachet de l'Etablissement

Observation sur la Structure Pédagogique
ou les Effectifs de l'Etablissement.

Date ——————

Nom et Fonction du responsable
de l'Enquête

ATTENTION : Dossier à établir en 3 exemplaires sans rien y modifier
Liser soigneusement les instructions suivantes avant de remplir les imprimes

Page 1 : Couverture : Préciser sur la couverture le Type d'Enseignement : Public (Moderne ou Original) Privé (Musulman, Ithade...) Compléter minutieusement la case réservée à l'identification de l'Etablissement (Province, Ville...).

Page 2 : Situation des Locaux.

Page 3 : Fiche d'Etablissement : (Type Marocain) Bilingue : Fiche Blanche. Arabisé : Fiche Bleue les chefs d'Etablissements qui ont les deux Types (Bilingue et Arabisé) rempliront les 2 fiches.

Page 4 : La Répartition des Elèves par sexe et année de naissance (Type Marocain).

Page 5 : Fiche d'Etablissement : (Type Français)

Page 6 : La Répartition des Elèves par sexe et année de naissance (Type Français).

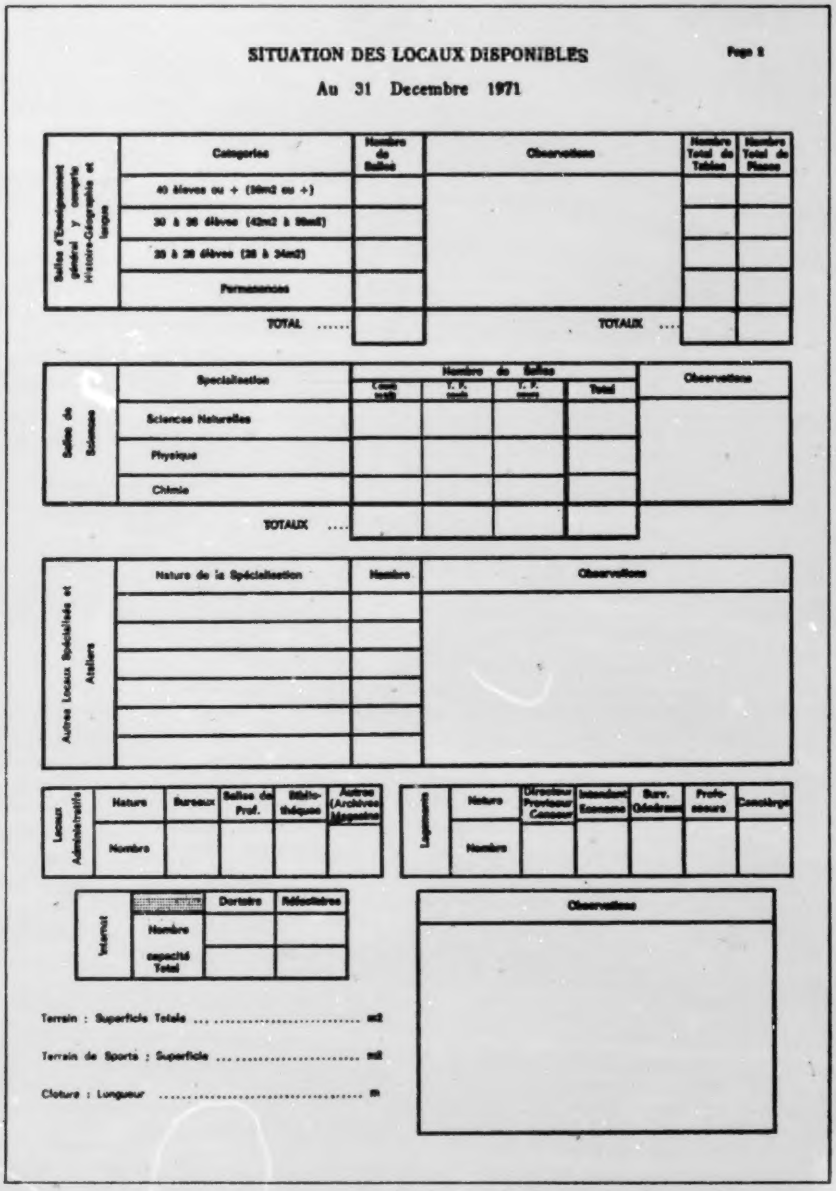
Page 7 : Personnel Enseignant et Administratif.

Page 8 : Personnel Enseignant par discipline : est à remplir avec le plus grand soin. A cet effet, dresser des listes suivant le modèle ci-dessous.

Nom des Enseignements	Nationalité (1)	Cycle d'Enseignement (2)	Situation Administ. (3)	Langue d'Enseign. (4)

(1) M : Marocaine, F : Français, AE : Autres Etrangers.
(2) Préciser : 1er cycle ; 2ème cycle
(3) Titulaire, Stagiaire, Suppléant.
(4) Enseignement en langue Arabe ou langue Française.

MOROCCO: SECONDARY SCHOOL CENSUS FORMS. 1. *Name and type of school.*



SITUATION DES LOCAUX DISPONIBLES

Page 2

Au 31 Decembre 1971

Salles d'Enseignement général y compris Histoire-Géographie et langues	Categories	Nombre de Salles	Observations	Nombre Total de Tables	Nombre Total de Places
	40 élèves ou + (50m2 ou +)				
	30 à 39 élèves (42m2 à 50m2)				
	20 à 29 élèves (28 à 34m2)				
	Permanences				
	TOTAL		TOTAUX		

Salles de Sciences	Specialisation	Nombre de Salles				Observations
		[illegible]	T. P. [illegible]	T. P. [illegible]	Total	
	Sciences Naturelles					
	Physique					
	Chimie					
	TOTAUX					

Autres Locaux Spécialisés et Ateliers	Nature de la Spécialisation	Nombre	Observations

Locaux Administratifs	Nature	Bureaux	Salles de Prof.	Biblio-thèques	Autres (Archives Magasins
	Nombre				

Logements	Nature	Directeur Proviseur Censeur	Intendant Econome	Surv. Généraux	Profe-sseurs	Concierge
	Nombre					

Internat		Dortoirs	Réfectoires
	Nombre		
	capacité Total		

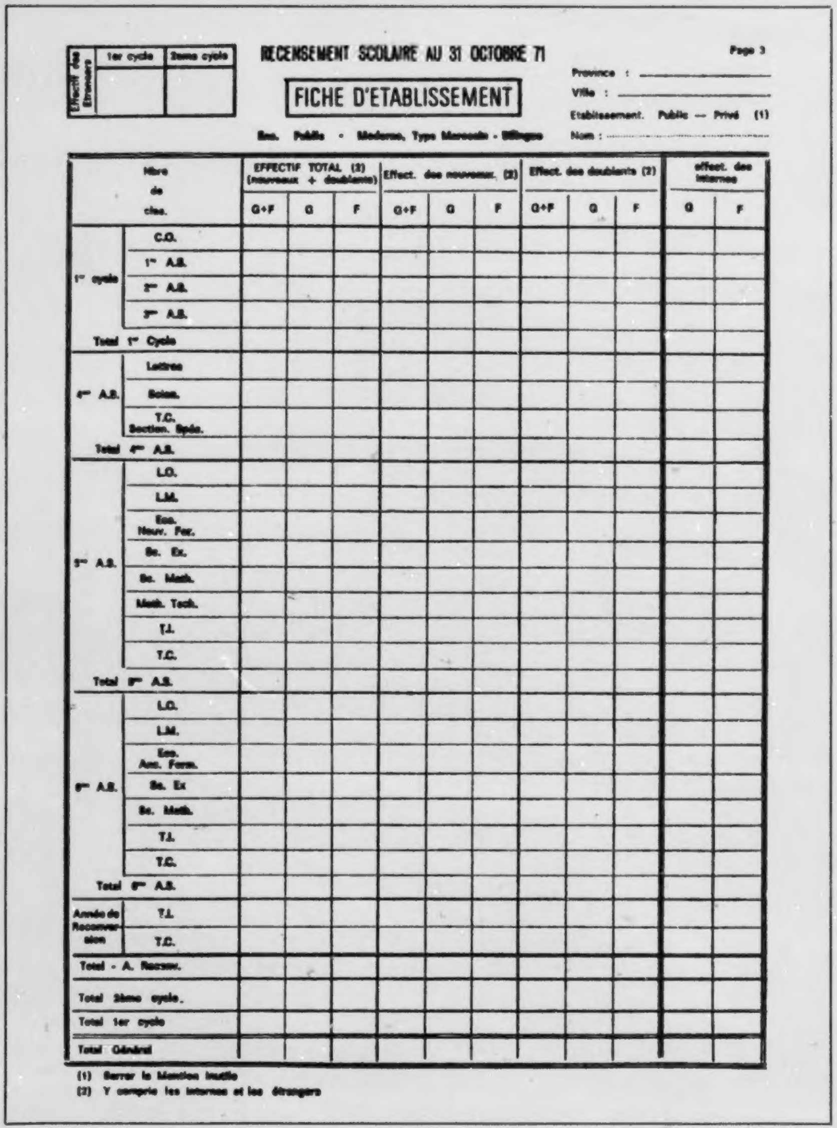
Terrain : Superficie Totale m2

Terrain de Sports : Superficie m2

Cloture : Longueur .... m

Observations

MOROCCO: SECONDARY SCHOOL CENSUS FORMS. 2. *Description of premises.*



Effectif des Etrangers	1er cycle	2ème cycle

RECENSEMENT SCOLAIRE AU 31 OCTOBRE 71

Page 3

FICHE D'ETABLISSEMENT

Ens. Public - Moderne, Type Marocain - Bilingue

Province : ____________

Ville : ____________

Etablissement. Public — Privé (1)

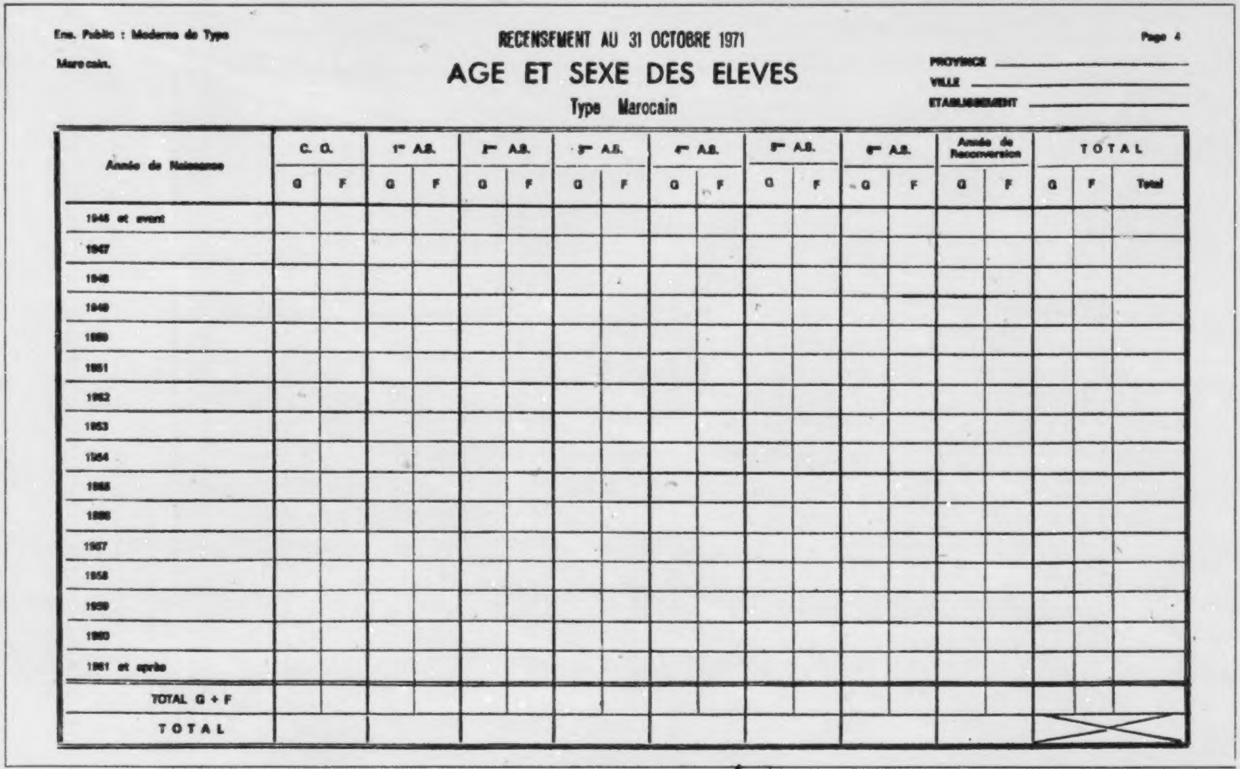
Nom : ....

Nbre de clas.		EFFECTIF TOTAL (2) (nouveaux + doublants)			Effect. des nouveaux (2)			Effect. des doublants (2)			effect. des internes	
		G+F	G	F	G+F	G	F	G+F	G	F	G	F
1re cycle	C.O.											
	1re A.S.											
	2me A.S.											
	3me A.S.											
Total 1re Cycle												
4me A.S.	Lettres											
	Scien.											
	T.C. Section. Spéc.											
Total 4me A.S.												
5me A.S.	L.O.											
	L.M.											
	Eco. Nouv. For.											
	Sc. Ex.											
	Sc. Math.											
	Math. Tech.											
	T.I.											
	T.C.											
Total 5me A.S.												
6me A.S.	L.O.											
	L.M.											
	Eco. Anc. Form.											
	Sc. Ex											
	Sc. Math.											
	T.I.											
	T.C.											
Total 6me A.S.												
Année de Reconversion	T.I.											
	T.C.											
Total - A. Reconv.												
Total 2ème cycle.												
Total 1er cycle												
Total Général												

(1) Barrer la Mention Inutile

(2) Y compris les internes et les étrangers

MOROCCO: SECONDARY SCHOOL CENSUS FORMS. 3. *Breakdown of enrolments by new entrants and repeaters, by sex and by streams.*



Ens. Public : Moderne de Type
Marocain.

RECENSEMENT AU 31 OCTOBRE 1971

AGE ET SEXE DES ELEVES

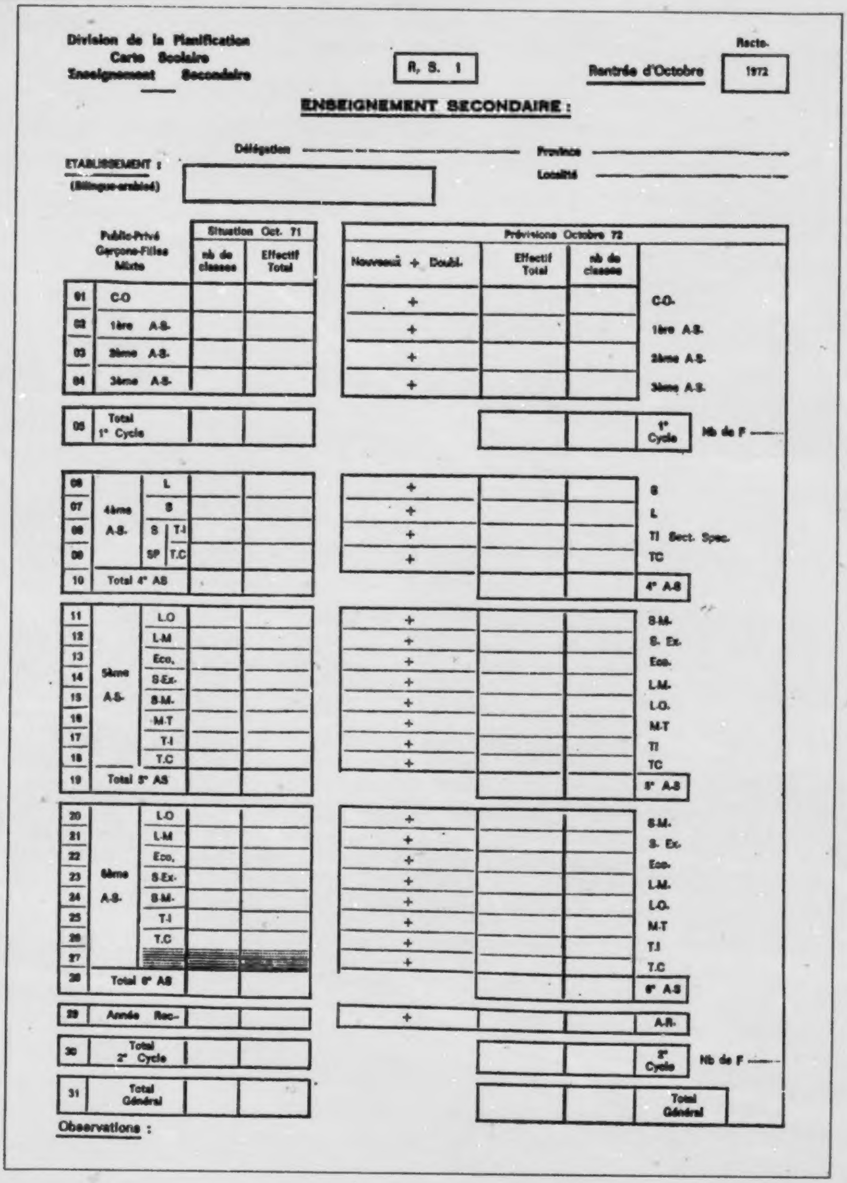
Type Marocain

Page 4

PROVINCE ______________________
VILLE ______________________
ETABLISSEMENT ______________________

Année de Naissance	C. O.		1er A.S.		2me A.S.		3me A.S.		4me A.S.		5me A.S.		6me A.S.		Année de Reconversion		TOTAL		
	G	F	G	F	G	F	G	F	G	F	G	F	G	F	G	F	G	F	Total
1946 et avant																			
1947																			
1948																			
1949																			
1950																			
1951																			
1952																			
1953																			
1954																			
1955																			
1956																			
1957																			
1958																			
1959																			
1960																			
1961 et après																			
TOTAL G + F																			
TOTAL																	☒		

MOROCCO: SECONDARY SCHOOL CENSUS FORMS. 4. *Breakdown of enrolments by age and sex, and by grade.*



Division de la Planification
Carte Scolaire
Enseignement Secondaire

R, S. 1

Recto.

Rentrée d'Octobre 1972

ENSEIGNEMENT SECONDAIRE :

ETABLISSEMENT :
(Bilingue-arabisé)

Délégation ____________________

Province ____________________

Localité ____________________

	Public-Privé Garçons-Filles Mixte			Situation Oct. 71	
				nb de classes	Effectif Total
01	C.O				
02	1ère A.S.				
03	2ème A.S.				
04	3ème A.S.				
05	Total 1° Cycle				
06	4ème A.S.	L			
07		S			
08		S	T.I		
09		SP	T.C		
10	Total 4° AS				
11	5ème A.S.	L.O			
12		L.M			
13		Eco.			
14		S.Ex.			
15		S.M.			
16		M.T			
17		T.I			
18		T.C			
19	Total 5° AS				
20	6ème A.S.	L.O			
21		L.M			
22		Eco.			
23		S.Ex.			
24		S.M.			
25		T.I			
26		T.C			
27					
28	Total 6° AS				
29	Année Rec.				
30	Total 2° Cycle				
31	Total Général				

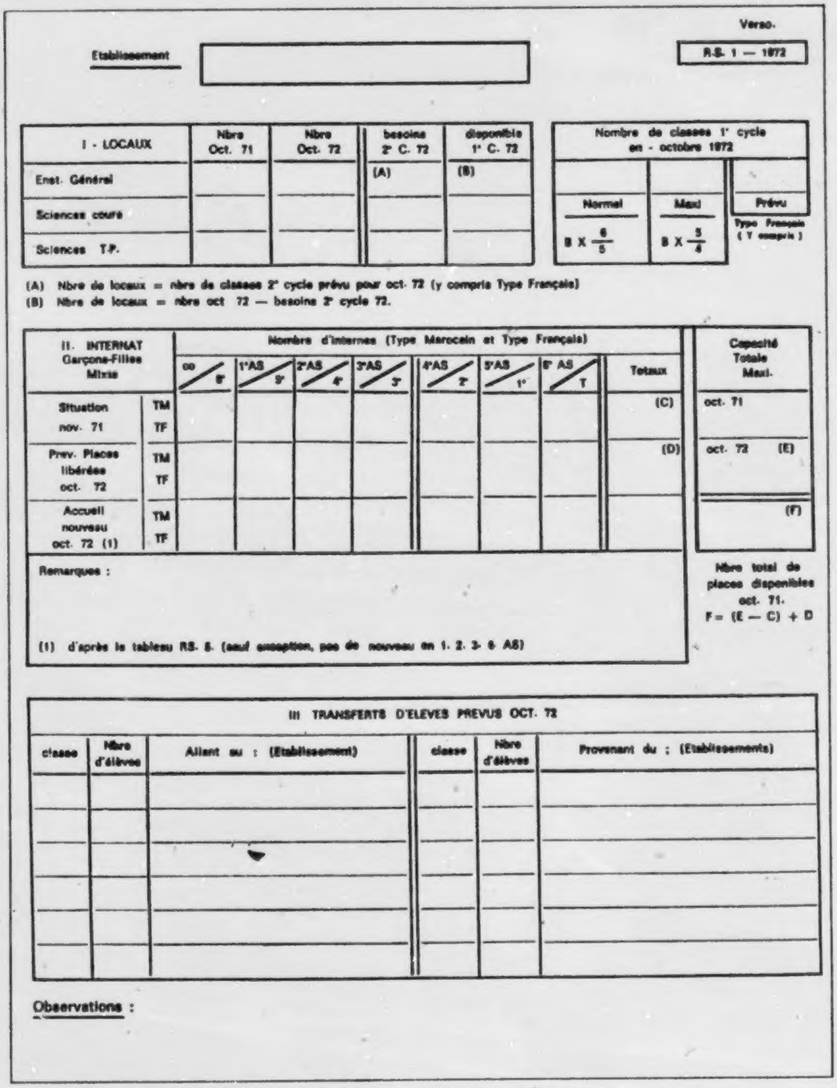
Prévisions Octobre 72			
Nouveaux + Doubl.	Effectif Total	nb de classes	
+			C.O.
+			1ère A.S.
+			2ème A.S.
+			3ème A.S.
			1° Cycle
+			S
+			L
+			TI Sect. Spec.
+			TC
			4° A.S
+			S.M.
+			S. Ex.
+			Eco.
+			L.M.
+			L.O.
+			M.T
+			TI
+			TC
			5° A.S
+			S.M.
+			S. Ex.
+			Eco.
+			L.M.
+			L.O.
+			M.T
+			T.I
+			T.C
			6° A.S
+			A.R.
			2° Cycle
			Total Général

Nb de F ——— (1° Cycle)

Nb de F ——— (2° Cycle)

Observations :

MOROCCO: SECONDARY SCHOOL CENSUS FORMS. 5. *Forecasts of enrolments for next school year (1971/72) by school and by grade, using transition and repetition rates.*



Verso.

Etablissement ☐

R.S. 1 — 1972

I - LOCAUX	Nbre Oct. 71	Nbre Oct. 72	besoins 2^e C. 72	disponible 1^e C. 72
Ens. Général			(A)	(B)
Sciences cours				
Sciences T.P.				

Nombre de classes 1^e cycle en - octobre 1972		
Normal	Maxi	Prévu
$B \times \frac{6}{5}$	$B \times \frac{5}{4}$	Type Français (Y compris)

(A) Nbre de locaux = nbre de classes 2^e cycle prévu pour oct. 72 (y compris Type Français)
(B) Nbre de locaux = nbre oct 72 — besoins 2^e cycle 72.

II. INTERNAT Garçons-Filles Mixte		Nombre d'internes (Type Marocain et Type Français)							
		co / 6^e	1^eAS / 5^e	2^eAS / 4^e	3^eAS / 3^e	4^eAS / 2^e	5^eAS / 1^e	6^e AS / T	Totaux
Situation nov. 71	TM								(C)
	TF								
Prev. Places libérées oct. 72	TM								(D)
	TF								
Accueil nouveau oct. 72 (1)	TM								
	TF								

Capacité Totale Maxi.
oct. 71
oct. 72 (E)
(F)

Nbre total de places disponibles oct. 71.
F = (E — C) + D

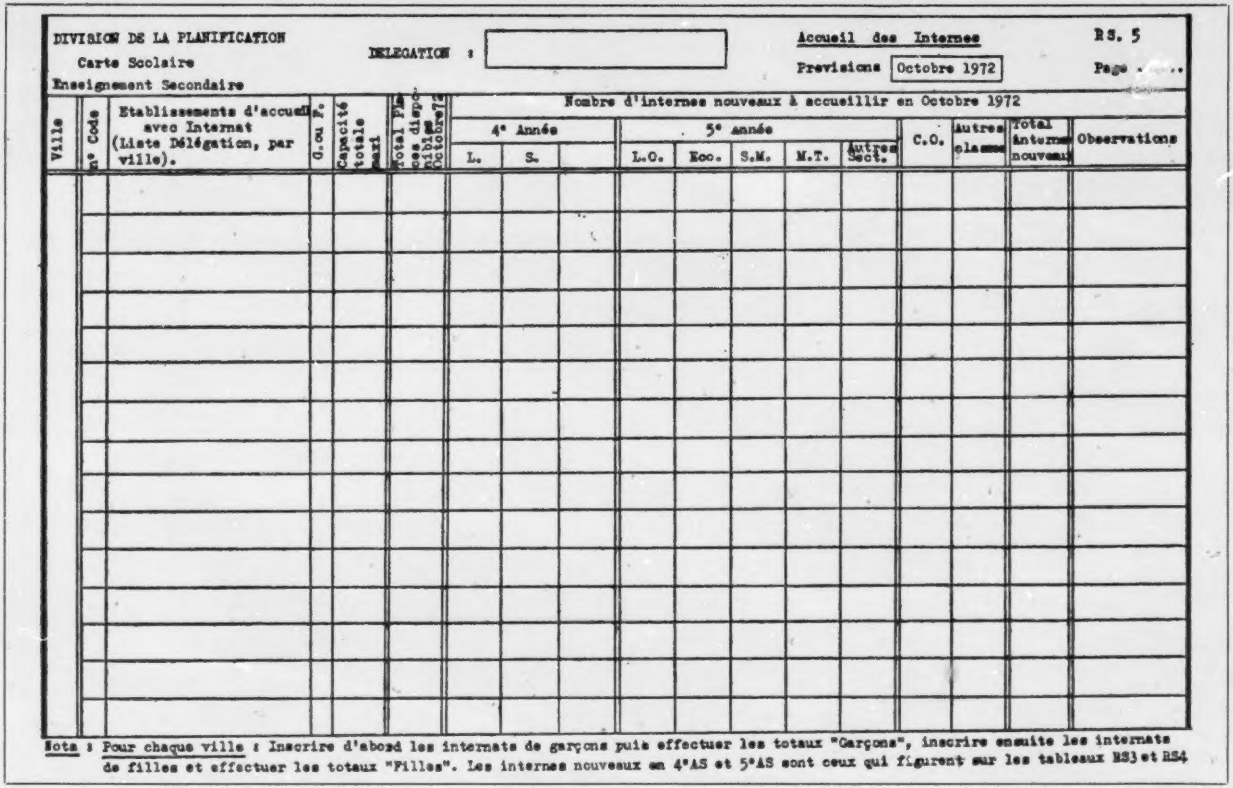
Remarques :

(1) d'après le tableau RS. 5. (sauf exception, pas de nouveau en 1. 2. 3- 6 AS)

III TRANSFERTS D'ELEVES PREVUS OCT. 72					
classe	Nbre d'élèves	Allant au : (Etablissement)	classe	Nbre d'élèves	Provenant du : (Etablissements)

Observations :

MOROCCO: SECONDARY SCHOOL CENSUS FORMS. 6. *Forecasts of accommodation available and required, boarding situation, and transfers of pupils from and to other schools.*



DIVISION DE LA PLANIFICATION
Carte Scolaire
Enseignement Secondaire

DELEGATION :

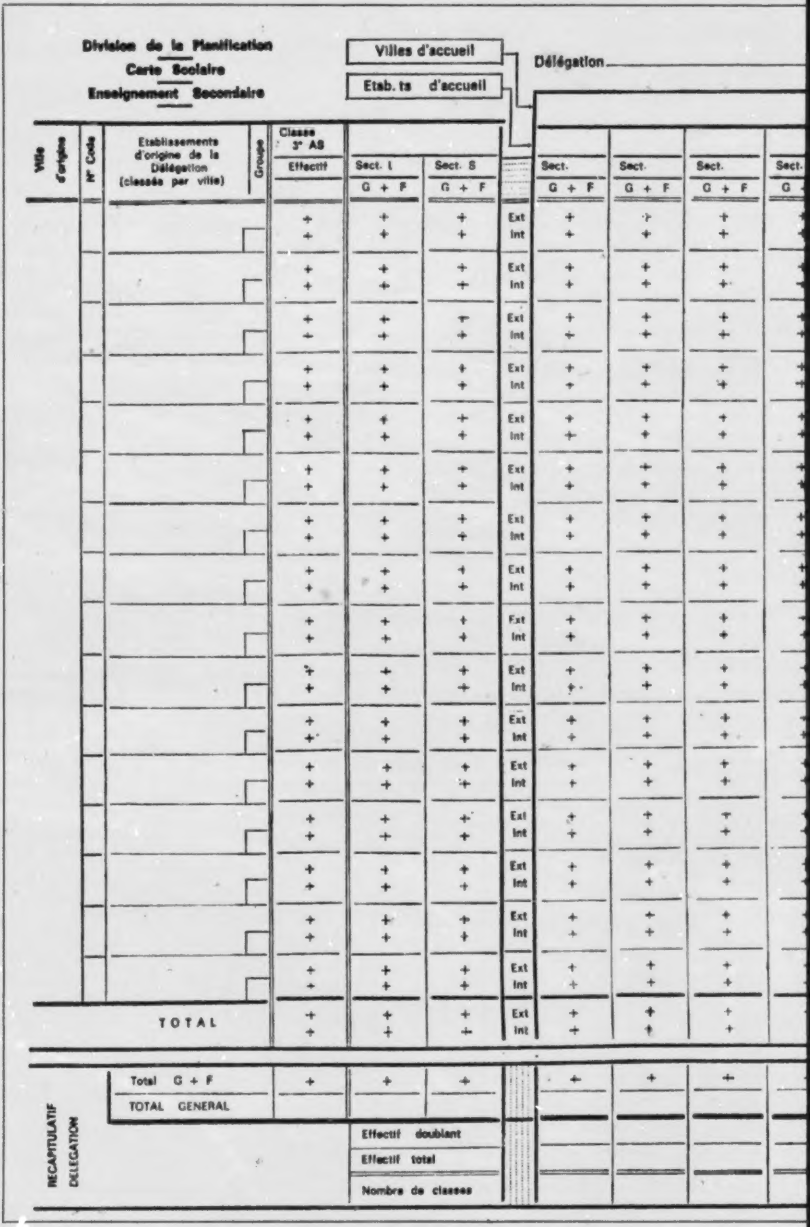
Accueil des Internes
Previsions Octobre 1972

RS. 5
Page ……

Ville	n° Code	Etablissements d'accueil avec Internat (Liste Délégation, par ville).	G. ou F.	Capacité totale mari	Total Places disponibles en Octobre 72	Nombre d'internes nouveaux à accueillir en Octobre 1972											
						4° Année			5° année					C.O.	Autres classes	Total internes nouveaux	Observations
						L.	S.		L.O.	Eco.	S.M.	M.T.	Autres Sect.				

Nota : Pour chaque ville : Inscrire d'abord les internats de garçons puis effectuer les totaux "Garçons", inscrire ensuite les internats de filles et effectuer les totaux "Filles". Les internes nouveaux en 4°AS et 5°AS sont ceux qui figurent sur les tableaux RS3 et RS4

MOROCCO: SECONDARY SCHOOL CENSUS FORMS. 7. *Forecast of boarding requirements by towns and districts.*



Division de la Planification
Carte Scolaire
Enseignement Secondaire

Villes d'accueil
Etab. ts d'accueil

Délégation ____________

Ville d'origine	N° Code	Etablissements d'origine de la Délégation (classés par ville)	Groupe	Classe 3e AS Effectif	Sect. L G + F	Sect. S G + F		Sect. G + F	Sect. G + F	Sect. G + F	Sect. G
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				+	+	+	Int	+	+	+	+
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TOTAL				+	+	+	Ext	+	+	+	+
				+	+	+	Int	+	+	+	+

RECAPITULATIF DELEGATION	Total G + F	+	+	+		+	+	+	
	TOTAL GENERAL								
			Effectif doublant						
			Effectif total						
			Nombre de classes						

MOROCCO: SECONDARY SCHOOL CENSUS FORMS. 8. *Forecast of intake by stream, sex, boarding/day, and schools of origin.*

RS 3/4

ORIENTATION EN FIN DE ______________ Prévisions Juin 197 page ______

Sect.	Sect.	Sect.	Sect.	Sect.	Sect.	Sect.	Sect.	Sect.	Sect.
G + F	G + F	G + F	G + F	G + F	G + F	G + F	G + F	G + F	G + F
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II. The elusive goal of universal primary schooling

For the past ten years and more the vast majority of countries have incorporated the goal of universal primary schooling into their overall planning. Experience shows that despite the unending increases in the amounts of financial, material and human resources devoted to education the goal is still very far off, and in the case of some countries it does not look as though it will be attained in the foreseeable future. The obstacles in the way are many and, for the most part, well known; however, a close analysis of the map brings to light a number of difficulties which must be dealt with before any education targets can be established.

The examples which follow suggest methods for making education plans more realistic, in other words, for bringing them into line with the geographical, economic, demographic and environment conditions prevailing in the countries concerned.

1. Uganda: how to deal with the population explosion

The importance of the population factor in the expansion of schooling facilities has been emphasized over and over again. When a country has a stagnant or declining population there are fewer and fewer children of school age; all that can be done is to attempt to keep educational commitment at the same level, unless a decision is taken to improve the standards of the school system or to extend the period of compulsory education. On the other hand, a country with an expanding population is faced with more and more children to educate, and must find increased funds for education. In such a case, a one-per-cent increase in a school age-group due to natural population growth results in an extra one per cent of teachers and premises without any accompanying improvement in teaching standards.

While this over-simplification may be helpful in arriving at an overall estimate of the relationship between demographic phenomena and the amount of resources to be allotted for education purposes, it will not do when it comes to making a precise estimate of educational funds to be found in each of several areas. It may well be that in certain schools, for example, premises and teaching staff are under-utilized and that a one-per-cent increase in enrolment will not call for any further efforts, while in others, because of the existing state of occupation of premises, a one-per-cent increase in enrolment will necessitate a three- to four-per-cent increase in teaching staff and premises.

Moreover, an average population increase of one per cent at national level often signifies that in certain parts of the country population figures are stagnating or going down while in others they are increasing very much faster because of population movements. As a result, pressure for schooling and needs in premises and equipment may be nil, or much higher than one per cent, depending on whether this or that geographical area is being considered. To assess these requirements accurately the techniques of the school map have to be applied. The report on Uganda[1] provides an example of how to make use of these techniques when an analysis has to be made of the relationship between demographic phenomena and educational expansion.

Uganda is faced with a number of problems common to African nations. It is a relatively small country with fairly limited resources, its rural economy resulting in a very low national income per head of population. After independence the country opted for a policy of economic and social development, with education as one of its primary components. In the last decade the school system has expanded considerably and is geared mainly to achieving the target of universal primary education and producing skilled manpower. Formerly, the establishment of new schools and the expansion of the old were entirely out of the hands of the Ministry of Education and usually left to parents or 'voluntary' organizations, or foreign missions. The aim was to provide for the largest possible portion of the population and to build schools both in towns and rural areas, but the unordered initiatives that developed revealed the lack of any consistent policy on locations with reference to the geographical distribution of educational supply, and resulted in patterns of schooling development that varied widely over the 18 districts of the country and helped little towards achievement of universal primary education (see Table 2).

In 1964 the government assumed control of the education system, and the financing and organizing of public schools are now in the hands of the Ministry in Kampala. The government is also paying the salaries of teachers in the private sector; private bodies continue to control the rest of current expenditure but this accounts for a fairly negligible part of school budgets. Thanks to the expansion of State aid for education and the progressive control of the system exercised by the Ministry, it became possible and desirable to contemplate setting up a rational school map for the country as a whole.

The Ankole district, which was the subject of the IIEP's investigation, lies in the southwest of the country; it consists of three geographical areas of widely varying character which typify the diversity of physical relief in Uganda: the high plateau on the east, with an average altitude of 1,250 to 1,500 metres, dry, with a pastoral economy and very low population density; the mountainous area on the west, wet and suitable for agriculture, with a population density going as high as 200 persons per sq. km.; finally, the Rift Valley floor which is almost entirely uninhabited, being a game reserve and part of a national park.

Ankole seemed an ideal choice because its school system has problems that are typical of the other districts in Uganda and a number of other countries in tropical Africa. Population growth is very fast (an increase of more than 50 per cent in ten years) and the mere effort of keeping pupil participation proportionately

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[1] W. T. S. Gould, *Planning the location of schools: Ankole District, Uganda*, Paris, Unesco/IIEP, 1973.

TABLE 2. Percentage enrolments of 5–14 age-group in Uganda, 1969

District	Boys		Girls	
	%	Rank	%	Rank
East Mengo[1]	55.4	2	51.2	3
West Mengo	64.0	1	60.4	1
Masaka	50.9	4	48.1	4
Mubende	54.3	3	53.6	2
Bugisu	46.0	6	37.2	5
Bukedi	41.5	9	26.3	8
Busoga	40.7	11	30.9	6
Karamoja	5.7	19	2.0	19
Sebei	38.0	13	19.3	16
Teso	41.4	10	22.4	13
Acholi	42.7	7	24.2	11
Lango	46.2	5	24.3	9
Madi	37.4	14	17.9	17
West Nile	31.1	18	13.7	18
Ankole	32.8	17	22.2	14
Bunyoro	34.5	15	22.5	12
Kigezi	33.2	16	19.7	15
Toro	38.2	12	24.3	9
UGANDA	41.8	8	30.7	7

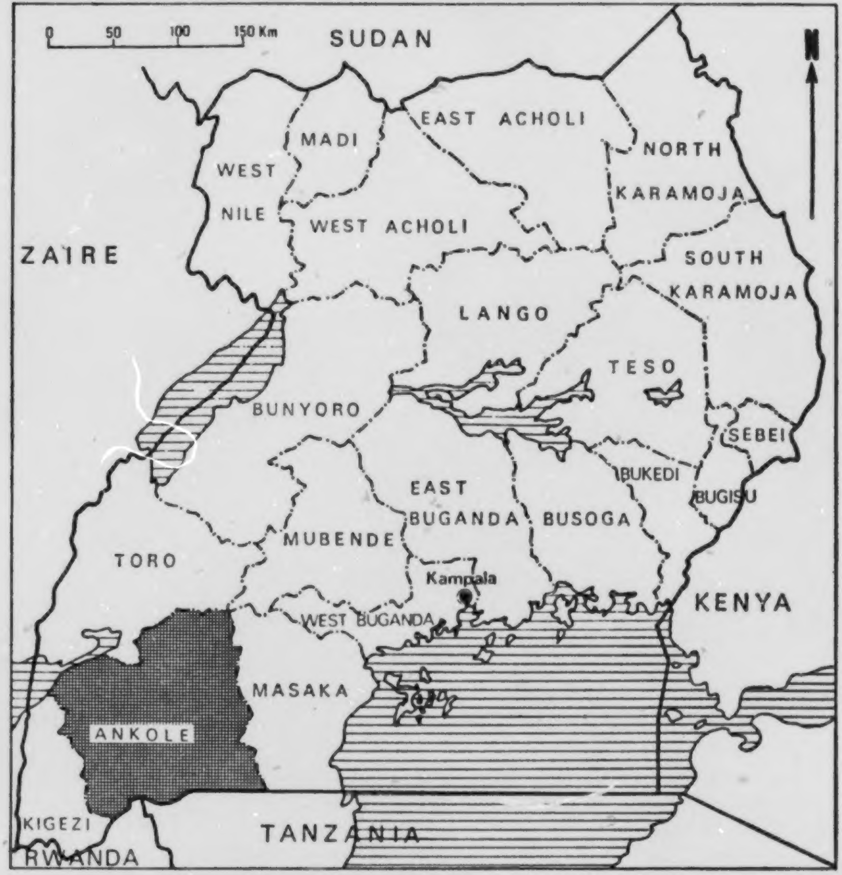
1. The districts listed are those which existed at the time of the census in 1969 and differ slightly from those in use at the time of the study, as illustrated in Map 4. East and West Mengo became East and West Buganda respectively and Acholi and Karamoja were each divided into two districts.

SOURCE W. T. S. Gould. 'Patterns of lower school enrolment in Uganda', in *East African Geographical Review*, Kampala, 1972 (No. 10, pp. 65–74).

constant means an equally rapid rise in enrolments. Geographical distribution of population shows great instability because of the importance of internal migration between the ten counties (*sazas*) of the Ankole district.

Four streams of population movement may be identified: (1) from high-density to low-density areas; (2) from the wet areas to the dry area, which is now inhabitable thanks to the extermination of the tsetse fly; (3) from the hill areas to the valleys; and (4) towards urban poles of attraction such as Mbarara, the chief town. As a result, the demand for schooling evolves in a different manner in each geographical area.

As throughout Uganda, the primary education school map of Ankole has evolved over the last sixty years without any prior planning and is the outcome of the activities of groups with coincident interests; overall, and in each *saza*, the consequence is an inefficient and unequal distribution of the resources for education. In fact, side by side with the state sector there is a very little known private sector: out of the 512 schools officially listed in 1970, 43 belong to the Church of Uganda, 37 to the Catholic Church, 4 to Muslim congregations, and 428 are financed and controlled by local authorities, to all intents and purposes by families. However, enrolment in this large group of private schools amounts to less than half the enrolments of the state sector, because nearly all of them provide only three or four years of schooling as compared with the seven years given in public schools. None the less, the private sector has aided and will continue to help in the extension of the educational system, whatever the financial limitations of the state.


0
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100
150 Km
SUDAN
N
ZAIRE
WEST NILE
MADI
EAST ACHOLI
WEST ACHOLI
NORTH KARAMOJA
SOUTH KARAMOJA
LANGO
TESO
BUNYORO
SEBEI
BUKEDI
BUGISU
EAST BUGANDA
BUSOGA
MUBENDE
TORO
Kampala
KENYA
WEST BUGANDA
MASAKA
ANKOLE
KIGEZI
TANZANIA
RWANDA

MAP 4. *Uganda, showing the location of Ankole district.*

The expansion that is taking place is at the expense of educational standards, since local authorities lack the means to pay qualified teachers (at 346 shillings a month)[1] and fall back on the recruitment of monitors (at 210 shillings a month). In addition, they are putting pressure on the government to take over their schools, and the district education officer considers that what is to be done is to give priority to recognizing and expanding the private schools, which the state sector will then be in a better position to control.

What are the basic criteria of this policy? What effects is it having on the geographical distribution of supply? How far does 'nationalization' meet the demands for schooling voiced by all the social groups concerned? And how far will it help to bring about more efficient use of the educational resources available? These are some of the leading questions, and it will be difficult to find answers to them as long as the appropriate statistics are unavailable.

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[1] 7.11 shillings = 1US$.

The author of the Uganda study, a geographer specializing in questions of demographic mobility in Africa, has had to make do with existing ministerial and census statistics. He has also carried out on-the-spot investigations in order to get at the heart of the school map. Finally, an overall examination of the whole district with a view to comparing the situation in each of the ten counties was completed by a study in depth of three selected sub-areas (*gombororas*) in the counties of Kasharis and Igara.

The principal factors influencing school attendance, namely distance, religious persuasion and schooling standards, are pinpointed and their importance assessed. It is possible, by taking account of these factors, to set up machinery for rationalizing the school map. Two schemes for organizing supply have been put forward, based on the assumption that in 1979 the participation rate will on average be close to its present level, but also with a view to achieving a levelling-out of this rate as between the counties. An attempt is made to assess the consequences of the two schemes for the shape of the primary-school map in each of the three geographical areas of Ankole, and these consequences are set out in more detail for the pilot *gombororas* selected. If a policy permitting rationalization of the school map is decided on, it would seem realistic enough to look forward to a geographical levelling-out of educational supply. However, the financial implications of an increase in the participation rate of pupils are so considerable that one can hardly expect to see the aim of universal primary schooling achieved in the medium term.

While the report on primary education is concerned in the main with regional and local maps, the secondary-education report concerns itself solely with the national map.

When it comes to secondary education, the school map obeys other laws and gives rise to very different problems; five of the ten public and private schools in Ankole are boarding schools and three others, which are day schools, take in boarders. Consequently, the catchment area concept is falsified to the extent that these schools may be taking in children from any part of the country. The questions arising at district level are the following:

(1) To what extent do admissions for secondary schooling deal equitably with the demand arising in the various counties of the district of Ankole?

(2) What are the factors influencing the demand for secondary education?

(3) Is it possible to improve the efficiency of schools and their geographical distribution?

In looking for answers to these questions, it was necessary first of all to obtain a clear idea of the conditions of secondary schooling at the national level and to indicate the extent of pupils' movements between the four main regions of the country, namely, East, North, West and Buganda. Next, on the basis of the statistical investigations made for the purposes of the present study, movements inside the Ankole district were analyzed so as to focus attention on the factors determining school frequentation. Moreover, it is interesting to note that the overall conclusions drawn after analyzing the secondary-school system are very similar to those reached in connection with the primary-school map, even if there is more overlapping in secondary-school catchment areas and the factors influencing school frequentation are rather different.

As no precise targets for secondary-education facilities in Ankole in 1979 had been set, proposals for rationalizing the school map were drawn up with three main aims in view, namely:

(1) improvement of secondary education facilities in the district in relation to the rest of the country;
(2) levelling-out of the distribution of the available supply within the district;
(3) reducing cost per pupil enrolled.

An examination was made of the various possible ways of achieving these aims. Were existing schools to be expanded or new schools created? Should catchment areas be regionalized? Of the boarding-school and the day-school system, which should be favoured? Should the running of private schools be rationalized? Where should the five new schools proposed in the study be located? All of them are questions indissociable from each region's special demographic and geographical conditions and its means of communication.

2. Morocco: rural-area schools

Primary education in rural areas raises formidable problems. Where villages are too small to justify a one-teacher school and several of them have to be amalgamated for the sake of a primary school, the problem of locating the school has to be faced; and regardless of the solution adopted, it may seem that families in the selected villages have been favoured at the expense of those living in the other villages. In cases where, despite the short distance to be travelled, school attendance remains at a low level, any idea of school catchment areas becomes questionable. If the few schools in an area are empty or almost so, despite the fact that there are enough children of school age to fill many more such teaching establishments, then the demand for schooling has diminished to the point where it is difficult to justify any plan for the expansion of education supply. And finally, in circumstances where the attendance of girls is at best sporadic and children are admitted to school at irregular intervals of three, four or five years, it would appear impossible to draw up a school map without first going into important questions such as attitudes to education, the factors influencing parents, and the need to adjust the school system in the light of socio-economic environment of the area. These questions and problems illustrate the difficulties met with in connection with schooling in rural areas, a field in which Morocco has a lot to tell the world.

The IIEP study of the primary school map[1] covers the Gharb Plain, an area which is part of the Kénitra province where the secondary-school map has been gone into in a separate investigation. It is an area mainly given up to farming and relatively well-off, an area of heavy soils, the result of river-deposits, limited on the west by the Atlantic Ocean and on the east by the Rif and the Moroccan Central Massif. The 1971 census put its population at 625,150. The density of population is high along the elevated banks of the rivers. Six population centres are rated as towns, but apart from the capital, Kénitra, none of them has more than 20,000 inhabitants. For administrative purposes, the Gharb Plain comprises two rural 'circles', those of Souk El Arbâa and Sidi Slimane (see Map 5).

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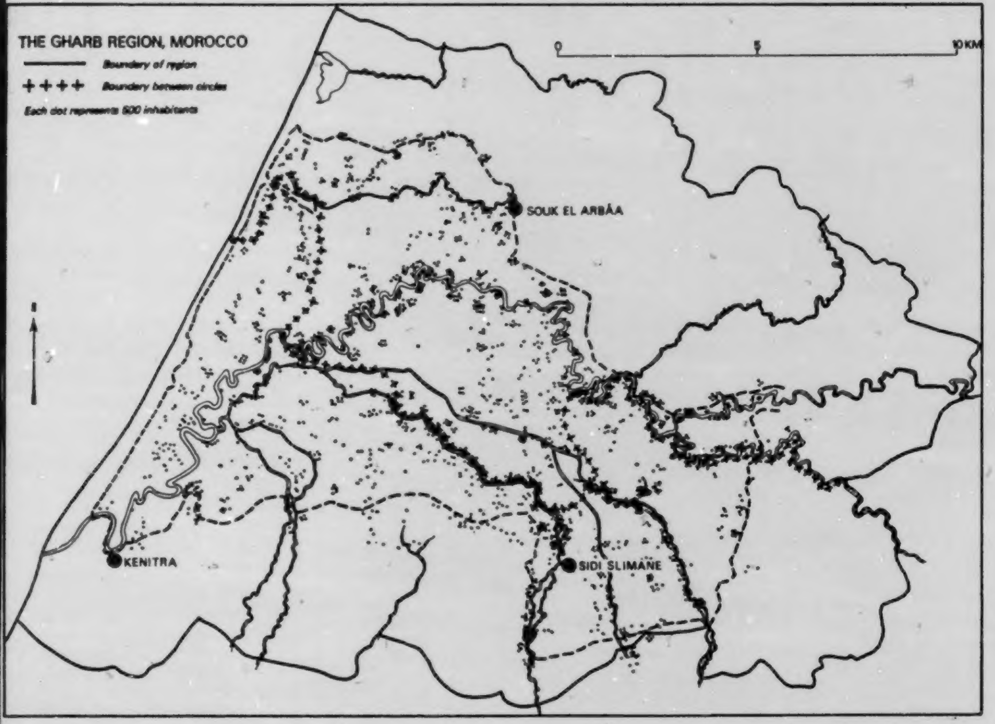
[1] R. Boudet and A. Badou, 'La carte scolaire de l'enseignement primaire dans la région du Gharb', dans G. Porte *et al.*, op. cit.


THE GHARB REGION, MOROCCO
Boundary of region
++++ Boundary between circles
Each dot represents 500 inhabitants
0
5
10 KM
SOUK EL ARBÂA
KENITRA
SIDI SLIMANE

MAP 5. *Morocco: the distribution of population in the Gharb region.*

To facilitate the working-out of a primary-school map methodology, those in charge decided initially on a pilot study of the Souk El Arbâa circle. Two approaches were adopted and followed, and results compared.

The first method, of an overall character, took in all the rural communes in the circle. An analysis was made of the demographic situation, of the educational level already attained and of the conditions in which schooling was offered; the authors then drew up a list of 'diagnostic indicators', the purpose of which was to permit classification of the communes in terms of the problems they encountered in the matter of schooling and according to the work-priorities of the school map. Next, an estimate was made of requirements by projecting the numbers of those of school age and applying the targets of the Plan. Lastly, proposals were arrived at commune by commune for the setting-up of schools in the light of requirements, and taking into account both the results of the diagnosis and the forecasts of the five-year plan. The calculations led to the conclusion that 200 schools needed to be built between 1973 and 1977; the number of classrooms to be provided in certain communes was 11, and in others 23 to 24. Everything depended on the number of premises already in existence and on the priorities for work in each commune.

The second method was more detailed, calling for an analysis of the school network in each commune. Two communes, Khémichet and Karia ben Aouda, were selected for a study in depth. To judge by the overall diagnosis (see Table 3) the first of these necessitates a selective operation while the second demands urgent, large-scale action. Each has a population approaching 31,000 inhabitants living in several dozen villages and hamlets, the so-called *douars*.

The communes were divided up into 'perimeters', a perimeter being a geographical area with a sufficient number of inhabitants and *douars* within a radius of about 5 kms. This delimitation takes account of the ethnic composition, of natural constraints, and of the characteristics of the road network. A dossier was established for each perimeter so as to permit a diagnosis of the education facilities to be provided. By taking into account the way in which the numbers of those

TABLE 3. Classification and action priorities[1]

Communes where action taken	Schooling indicator	Population indicator	Points scored	Action priorities
Karia ben Aouda	9	11	20	Urgent
Sidi Mohamed el Ahmer	7	11	18	large-scale action
Ain Defali	10	8	18	First
Jemaa Haouafate	8	10	18	priority
Kémichet	8	6	14	Selective action
Dar Gueddari	5	10	15	(cf. indicator
Souk Tleta du Gharb	5	8	13	synthesis table)
Nouirate	4	6	10	Second
Had Kourt	4	6	10	priority
Jorf el Melha	3	2	5	Basic programme
Laila Mimouna	3	2	5	continued with

[1] For further details, see the study, op. cit.

with a right to schooling were likely to evolve, it proved possible to 'localize' the potential demand for education through a geographical breakdown inside each commune.

Proposals for organizing the school map need to be integrated with proposals from all bodies concerned with national development. For this reason the 'chart of public facilities and amenities' drawn up in 1968 by the town-planning and housing directorate of the Ministry of the Interior was taken as the reference framework. The chart makes a distinction between elementary sectors (3,000 persons on an area of 2,500 hectares), secondary sectors (7,500 people on an area of 7,500 hectares) and tertiary sectors (30,000 people on an area of 30,000 hectares). Primary schools were to be located in the secondary centres and secondary schools in the tertiary centres. Finally, the authors adopted the standards for furnishings and equipment (with a minimum of three classes and a maximum of 30) and set up catchment-area standards in the light of population densities.

Applying this methodology to each commune, prospective school maps were drawn up for 1977/78, the plan's horizon year. Of the numerous conclusions reached as a result of this investigation, the authors laid stress on four particularly important ones, namely:

(1) The criteria for locating regional development centres do not always accord with the criteria for setting up schools as such; the decision as to which criteria are to have priority is an important preliminary for the drawing-up of the school map for the whole country, the more so that in practice the lack of any effective policy for regional development and national planning does not encourage the setting-up of schools in 'development pivots', whether elementary, secondary or tertiary.

(2) Those in charge ot the investigation found that it was impossible to make a systematic comparison of various solutions for the localization of schools because of the lack of data on costs standards. They concluded that before the Gharb area study could be applied on a nationwide basis, investigations would have to be made into the standardization of premises and into current and capital costs resulting from the adoption of various alternatives, such as day-schools, school transport systems or boarding-school facilities.

(3) While it is normal to consider the school map as an essential instrument for achieving the target of universal primary schooling, the investigation points to the conclusion that the provision of education offers no guarantee whatever that classes will be attended; in the Moroccan context, besides the problems of the school map, there is the additional problem of ensuring attendance at the schools.

(4) The requirements in the matter of premises, teaching staff and furnishings and equipment obtained by following the two methods of drawing up the school map indicate that in the Souk El Arbâa circle the Plan's forecasts under-estimate teaching staff by 20 to 30 per cent; as a result, either the costs written into the Plan need to be revised (upwards), or the education targets ought to be reduced. In any event, it will be difficult to achieve the aim of universal schooling before several years have passed. In this connection, school-map techniques appear to have their utility, not only while plans are being carried out, but also while they are being drawn up, as instruments for testing the plausibility of the education targets set.

3. The Ivory Coast: schooling by means of television

The rapid advances in the matter of primary schooling in most African countries over the last fifteen years or so have not been made without difficulty. An enormous wastage of resources is evidenced by high repeater and drop-out rates; discrepancies have arisen as between one area and another in school-attendance rates and the possibilities of getting schooling, and the flight that has taken place from the countryside to the town has been stimulated by an ill-adapted education system. To deal with these difficulties initiatives were taken in various directions; a reform programme was initiated for structures, content and curricula; a remodelling of teachers' training schemes was carried out, education was brought to the countryside, and audio-visual aids were introduced in the shape of radio, educational film, transparencies and television. The most spectacular example, for breadth and the scope of its ambition, is undoubtedly the educational television scheme in the Ivory Coast.

In 1968 the authorities decided to use television in all the primary schools of the country. The volume of resources required for the scheme explains the numerous research-jobs and preliminary investigations that were undertaken, with several countries and international organizations participating.[1] The investigations made dealt with features as varied as pedagogic methods, curricula, teacher training, the evaluation of the financial aspects and the problems connected with the execution of the project. Our report on the Ivory Coast school map[2] falls within this framework; and constitutes (i) an examination of how educational supply was to be assured in practice with due regard to the general limitations of the environment—demographic, economic, administrative and infrastructure—and the specific limitations of television, such as broadcasting relays, the transmission network and reception conditions; and (ii) a test to determine whether the national education plan, aiming at an 82 per cent primary-school attendance rate by 1981, is realistic or not; this was done by closely examining the practical means of reaching the target.

As is true of schools in countries in that part of Africa, the primary school in the Ivory Coast suffers from a number of inadequacies, including high wastage rates (as high as 40 to 50 per cent in certain schools), ill-adapted curriculum content based on patterns taken over from other countries, teaching methods designed to inculcate knowledge, but not to promote understanding nor the practical application of knowledge, under-qualified teaching staff with only a period of summary training behind them and cut off from the economic and social realities of the world around them. Lastly, there are large discrepancies between one area and another, both in school frequentation level, and in the progress being made in providing education. We pointed out that (a) primary school enrolments have gone up at average annual rates ranging from 0.9 per cent to 10 per cent according to the area; and (b) the participation rates are 45.5 per cent in rural areas, 50.7

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[1] From 1968 on, IIEP studied the financial implications of Ivory Coast ETV; cf. 'Ivory Coast: the cost of introducing a reform in primary education', in *Educational cost analysis in action: case studies for planners—II*, Paris, Unesco/IIEP, 1972.

[2] J. Hallak, G. N'Guessan, A. Krizo and B. Duvieusart, *Méthode de préparation de la carte scolaire: les sous-préfectures de Sikensi et Dabakala, Cote-d'Ivoire*, Paris, IIPE, 1976.

per cent in the big towns, 77.4 per cent in centres of some importance and 91 per cent in small towns.

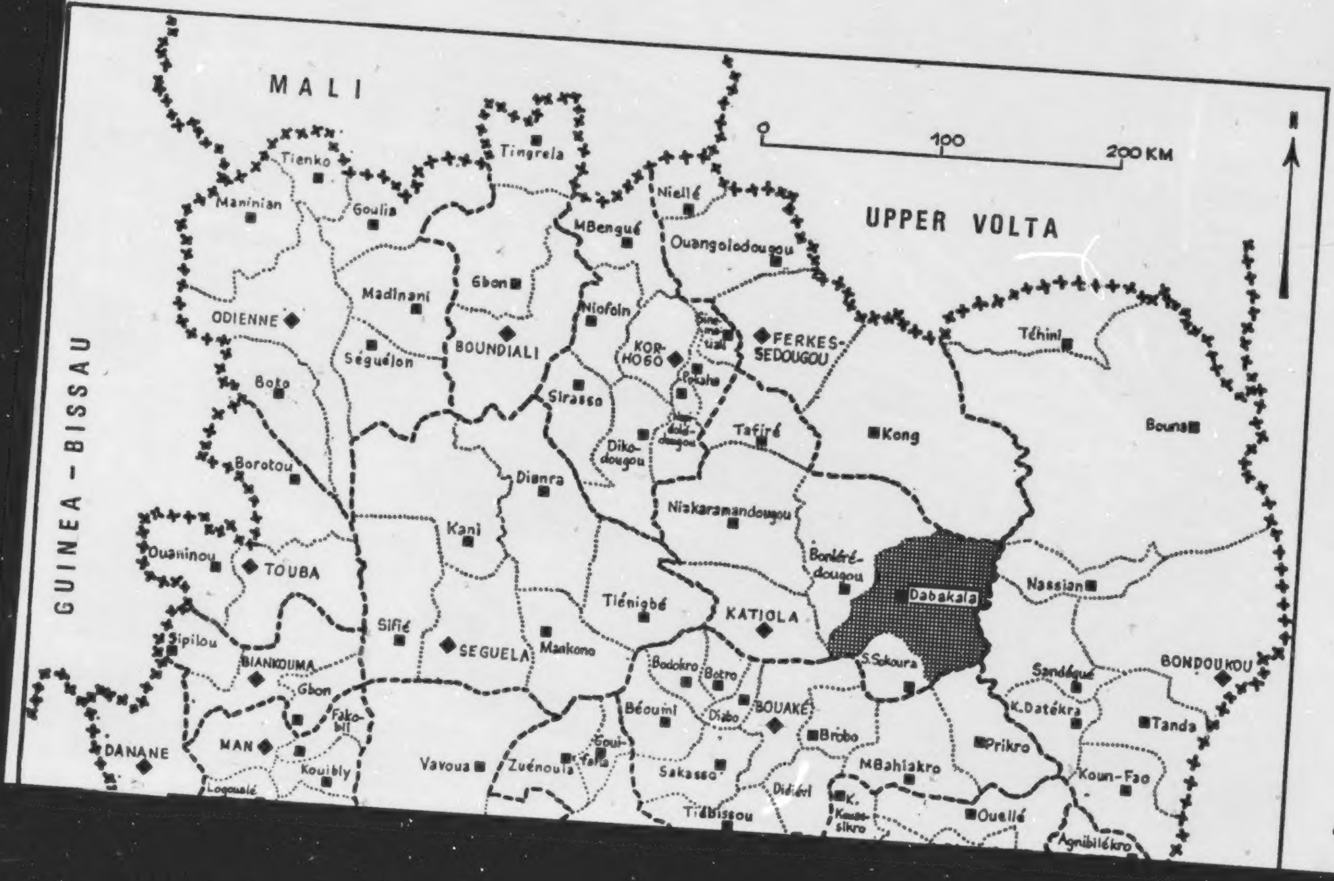
Admittedly, implementation of the primary-school map does not go back very far: the first school map was drawn up in 1968, in response to a 10 March 1967 decree instituting school-map committees. It was only then that the distribution and localization of schools in the territory came under the control of a new body, the National School-Map Committee which, it was expected, would enable the characteristics and requirements of the various areas to be better defined and taken care of respectively. When asked to evaluate what has been done in the last five years, those in charge reply that political pressures continue to prejudice the Committee's decisions so long as there are no means of effectively controlling school construction; they argue that the Committee's activity is paralysed by the opening of schools which often are set up to the detriment of more needy regions and render inoperative any attempt at harmonious programming of educational expansion in the country's various areas. The first conclusion reached as a result of our investigation was that, if an equitable and rational map was to be brought into operation, much remained to be done in the field of regulations and institutions.

The second need is of a technical order: there is no point in expecting to see any satisfactory programming of educational supply unless precise information is available in respect of the demand for schooling. This demand depends (i) on what will happen to those of school age, the number of these being known more or less, (ii) on the targets written into the plan for the admission of children of the 6 to 7 age-group, and (iii) on prevailing practice in relation to promotion from one class to another—in the television system of schooling promotion is automatic, while under the traditional system repeats are accepted.

Having underlined these pre-requisites, those responsible for the investigation proceeded to draw up a television school map. With this map in view, two pilot areas were selected—the sub-prefecture of Sikensi in the south, and that of Dabakala in the north (see Map 6).

The sub-prefecture of Sikensi lies 95 kms. north-west of Abidjan; it has a population of about 25,000 and is one of the richest and most highly developed areas of the country; schooling has reached a relatively high standard, and has benefitted from a well-developed road network and proximity to the capital: the apparent rate of school attendance is about 75 per cent. The area, it is true, has a complete school network, with 16 schools for the 17 villages comprising the sub-prefecture. The schools on the whole are well built and well maintained; of 89 classrooms in use, only 9 show any sign of deficiencies. Pedagogic structures imposed by educational television (3–6, 9–12 classes) are observed, with the exception of three schools: and 20 television classes, in seven schools, are already working. Applying a television school-map in Sikensi to promote achievement of the Plan's 82-per-cent schooling target does not involve any particular difficulty; nor should it entail difficulties in most of the sub-prefectures in the south of the country, where one encounters the same characteristics as in Sikensi.

The situation in the Dabakala area in the north is vastly different. Population density is much lower, with three inhabitants to the sq. km., as against 16 inhabitants to the sq. km. in Sikensi; people are widely scattered at that, with more than 220 villages embracing several ethnic groups. The communications network is inadequate. Dabakala is a marginal area and slowing down (the balance of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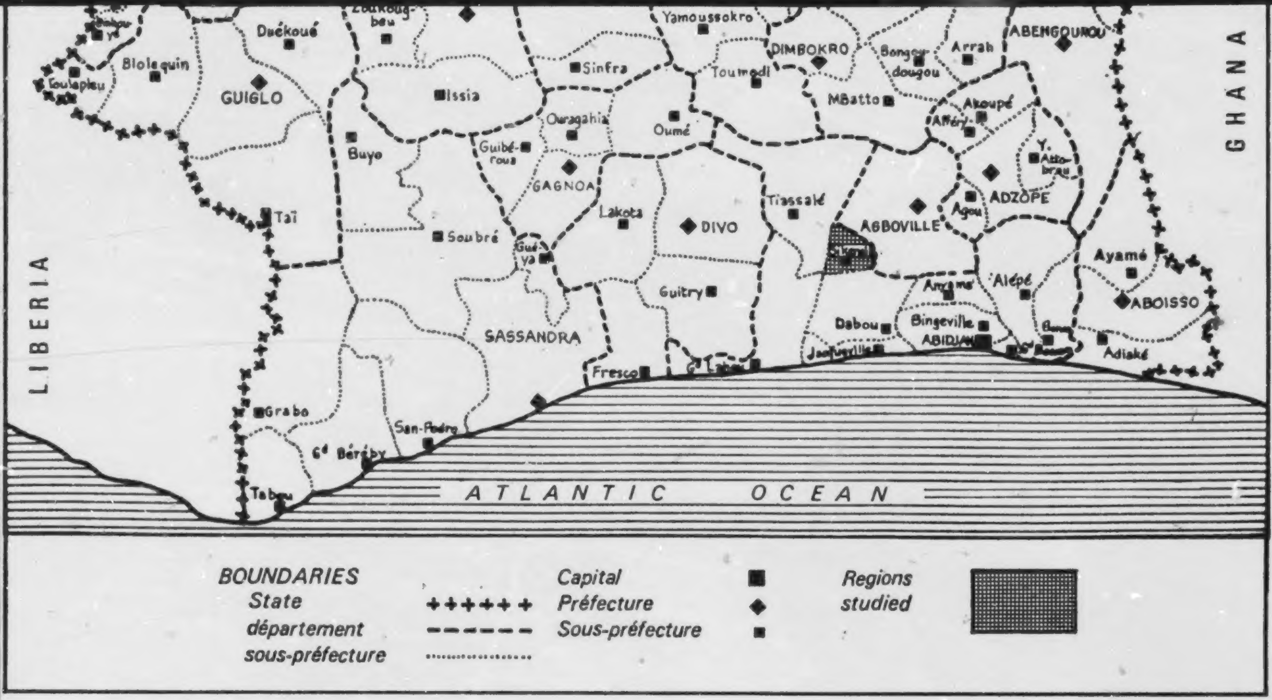
Madinani
Niofoin
ODIENNE
BOUNDIALI
KORHOGO
Sinématiali
FERKESSEDOUGOU
Téhini
Séguélon
Boko
Sirasso
Tafiré
Kong
Bouna
Dikodougou
Borotou
Dianra
Niakaramandougou
Kani
Ouaninou
TOUBA
Boniéré-dougou
Dabakala
Nassian
Tiénigbé
KATIOLA
Sifié
SEGUELA
Mankono
Sipilou
BIANKOUMA
Gbon
Bodokro
Botro
S.Sakoura
Sandégué
BONDOUKOU
Béoumi
Diabo
BOUAKE
K.Datékro
Fako-bli
MAN
DANANE
Goui-fla
Brobo
Prikro
Tanda
Vavoua
Zuénoula
Sakasso
MBahiakro
Kouibly
Logoualé
Didiévi
Koun-Fao
Tiébissou
K. Kouassikro
Ouellé
Agnibilékro

63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Yamoussokro
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Arrah
ABENGOUROU
Bloléquin
Toulepleu
GUIGLO
Sinfra
Toumodi
Issia
MBatto
Akoupé
Afféry
Ouragahio
Oumé
Buyo
Guibéroua
GAGNOA
Y. Attobrou
ADZOPE
Tiassalé
Agou
Taï
Lakota
DIVO
AGBOVILLE
Soubré
Guéyo
Ayamé
Alépé
Anyama
Guitry
ABOISSO
Dabou
Bingerville
ABIDJAN
SASSANDRA
Jacqueville
Bonoua
Adiaké
Fresco
Gd Lahou
Gd Bassam
Grabo
San-Pedro
Gd Béréby
Tabou
BOUNDARIES
State
département
sous-préfecture
Capital
Préfecture
Sous-préfecture
Regions studied

MAP 6. *The administrative divisions of the Ivory Coast.*

population movements is negative). The sub-prefecture has only 17 schools, with enrolments on the whole low in number; the attendance rate is also low, one of the lowest in the Ivory Coast. School attendance by girls is only half that for boys. Problems are met with in connection with the assignment of teachers to the area's isolated villages, and 18 per cent of classes (otherwise in good condition) are unable to function for lack of a teacher. Every school is without electricity or running water. Only in seven of the schools are pedagogic structures imposed by educational television observed and in any case, according to the latest information available, television programmes can be received only in a very small part of the sub-prefecture; in all, six television classes are operative. As a result, it is foolish to anticipate realization of the plan's 82-per-cent school-attendance target here, or to believe that educational television can be introduced for the whole area unless important decisions concerning school-map organization are taken. These decisions should involve:

(a) dividing up the sub-prefecture into 'catchment areas' corresponding to module 3[1] pedagogical structures, while taking into account means of communication and available infrastructure equipment as well as pinpointing the area of residence of the various ethnic groups in the vicinity;

(b) standardization of the maximum distances which pupils attending various schools will have to cover;

(c) strict control of new schools or new classes in existing schools;

(d) organizing canteens (or scholarships) for children forced to live away from home and to look for a place to sleep in the school village;

(e) establishing a system of television relays to serve the villages with schools. In other words, what has to be done is to draw a television reception map in the light of the school map, and not the opposite.

The considerable reservations that have been made indicate the difficulties in the way of introducing educational television and reaching the Plan's schooling targets. This is a valid conclusion, not only for the Dabakala sub-prefecture but also for most of the areas in the north and west of the country.

4. Iran: amalgamate villages for the sake of providing education?

Providing education in rural areas is normally fraught with difficulties and problems; qualified teachers refuse appointments in isolated villages, villagers refuse to send their children to school because they are dependent on them for help; parents hesitate to entrust their daughters to men-teachers; some villages have few inhabitants and consequently too few children for an ordinary primary school; 'multi-grade' classes are often poorly run and ineffective; the lack of roads or satisfactory means of communication makes it difficult to get books and teaching materials to the school and places difficulties in the way of organization of school transport; and so on.

No country or continent has a monopoly of these social, economic and schooling problems, but Iran with some 50,000 villages, most of them inaccessible, has for the last ten years or so been facing them all and doing it with great perseverance. Some years ago it instituted a system of remoteness bonuses to encourage teachers

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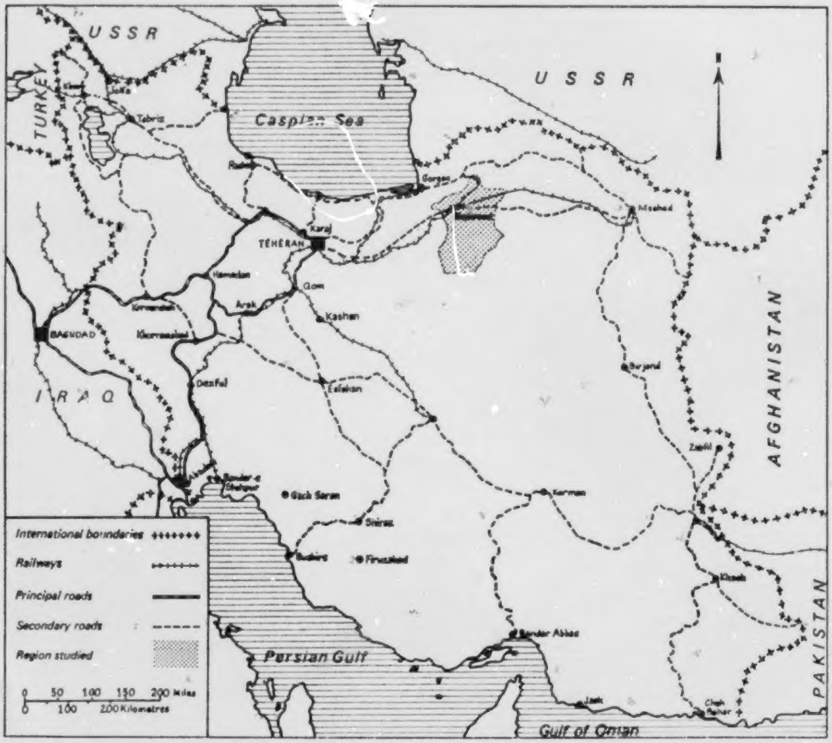
[1] i.e., with 3, 6, 9, 12 . . . 3 × 12 classes.


USSR
TURKEY
Julfa
Tabriz
Caspian Sea
Rasht
Gorgan
Karaj
TEHERAN
Hamadan
Qom
Arak
Kashan
Kermanshah
Khorramabad
BAGHDAD
IRAQ
Dezful
Esfahan
Abadan
Bandar-e Shahpur
Gach Saran
Shiraz
Bushehr
Firuzabad
Mashad
Birjand
Zabol
Kerman
Khash
Bandar Abbas
Jask
Chah Bahar
AFGHANISTAN
PAKISTAN
Persian Gulf
Gulf of Oman
International boundaries
Railways
Principal roads
Secondary roads
Region studied
0 50 100 150 200 Miles
0 100 200 Kilometres

Map 7. *Iran, showing the location of the Chahrestan of Chahroud.*

to accept appointments in rural areas; it has a system of civic service, the Literacy Corps,[1] with the vital priority task of providing service to a series of small villages with no schools; it also possesses a 'Women's Literacy Corps', founded to promote the emergence of a feminine element in the teaching profession; and has organized a number of literacy projects to make parents in particular more receptive to development problems and to the importance of schooling for children. The Vth and VIth Plans opted for a great regional expansion programme hinging on the setting-up of integrated community development centres, as well as the target of universal primary education by horizon year 1983, when the VIth Plan comes to an end. The overall result of this is that countries facing similar problems can look to Iran as a laboratory of no mean importance.

The country is divided into 14 *ustans* or provinces; each ustan comprises a number of *shahrestans* or cantons. The *shahrestan* of Chahroud, which was the subject of our investigation, is part of the Semman region north-east of Teheran and representative of the wide variety of climate and physical relief by which the country is characterized, namely 60 per cent mountain and desert, and 40 per cent plain. It has a very young population, as has the rest of the country, with more than 50 per cent under 20, scattered over some 300 villages of which 200 have less than 100 inhabitants, and some 40 have 100 to 250. How are the children in these small villages, most of them in inaccessible areas without a suitable road network, to be educated? This is the problem facing Iranian school-map experts working within the framework of a government plan that aims to provide schooling for 65 per cent of children between 6 and 10 before 1978 and for almost the entirety of the age-group by the time the VIth Plan comes to an end in 1983.

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[1] See an economic assessment of this experiment in Jacques Hallak, M. S. Cheikhestani and H. Varlet, *The financial aspects of first-level education in Iran*, Paris, Unesco/IIEP, 1972.

Having described the area's characteristics, the study[1] goes on to show how very widely the conditions for educational expansion vary from one village to another; the percentage rate of children receiving schooling varies from 21–22 per cent in the mountain and desert areas to 70–78 per cent in the capital and the plain; pupil/teacher ratios range from 16 to 45 and repeater rates from 3 to 13 per cent, and the same is the case with backwardness, the condition of premises, and costs. The importance of the 'school-size' factor (which has been brought out in a number of studies in this series) is confirmed here, and one is obliged to talk in terms of a standard minimum school-size if there is to be any guaranteed economic use of funds allocated for education. In the light of population movements in Chahroud, and even given that data on population movements are scrappy, it seems clear that well-nigh 70 per cent of the villages will not be able to provide the minimum number of children for the opening of a school. If, then, 65 per cent of children in the age-group in question are to get schooling in the short and medium term, expensive sub-standard solutions will have to be found and ordinary primary schools opened up even for an enrolment of 20; moreover, Literacy Corps schools will be forced to work with only 10 pupils, and this at a time when expenditure on salaries per pupil is 60 to 70 per cent higher in schools with less than 25 pupils than in schools with a hundred. In fact, the only possibility is to accept solutions involving this range of expenditure, since it is not materially possible to transport children to 'viable' schools given the present lack of a road network that can be used throughout the year; it is, therefore, inevitable that one-teacher schools will be kept in existence during the life of the Vth Plan.

As against this, more radical measures are contemplated after the end of the next five-year period. The school map will be able to make use of changes resulting from the government's regional policy. All villages with less than 50 inhabitants will have gradually disappeared and their populations will have been brought together in larger villages; all villages with more than 300 inhabitants, of which there were 70 in 1972, will be linked up by a good network of secondary roads; on the whole, the others will be accessible and selected development centres will be working towards amalgamation of the populations affected. The school map will follow this reorganization of the countryside and is counting on the success of this policy. The policy will give rise to a network of central schools and amalgamation schools, these being linked to so-called satellite schools; in urbanized areas, and in those with a high population density, independent schools with a complete pedagogic structure will continue. Normally, the map so drawn should make it possible to provide the number of pupil-places required for universal education in each village of the canton; in practice, there is nothing to guarantee that the children, and girls especially, will attend the schools so set up. The Chahroud study insists therefore on the need for bringing in a number of accompanying measures to stimulate the demand for schooling and keep it at a satisfactory level; the setting-up of the women-teachers' training centres constitutes one of these measures; it is, in fact, one of the few ways of getting village girls to school.

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[1] J. Hallak, K. R. Sohrab, F. G. Saghafi, A. A. Minnaie and M. S. Sheikhestani, *Méthode de préparation de la carte scolaire: le Chahrestan de Chahroud, Iran*, Paris, IIPE, 1975.

What has been said above refers to schooling given in the traditional way, in the school. There is no reason why other means should not be contemplated, such as educational radio and the distribution of transistor receivers in the villages. What has been done in certain countries in Africa and Asia shows that the success of educational radio depends in large measure on reliability of reception and continuity of feedback. Consequently, here also, problems of communication between village and village need to be faced, a supply of batteries must be available in the villages, receivers will have to be maintained and a regular system of correspondence by post, or other means, guaranteed. Obviously, these preliminary conditions will be fulfilled only to the extent that road development projects are carried through.

There is, of course, no guarantee that all these conditions for bringing the school map into effect will be met nor, in particular, that the projects for amalgamation of village populations and road network expansion will be executed. This being so, is it realistic to expect to see universal primary education in Iranian country districts in the near future? The Chahroud area case study makes it seem unlikely.

The school map is an integral part of the planning process, and thus a tool for the practical realisation of the objectives of the overall Plan. Among these objectives, the goal of universal primary schooling is still very far off, and it does not look as though it will be attained in the foreseeable future

- *—in Uganda, where maintaining even at its present level the rate of school attendance demands a considerable effort, because of a galloping rate of population growth;*
- *—in Morocco, where a pilot study of one rural area revealed that global planning methods had resulted in a 20 to 30 per cent under-estimation of the number of teachers required;*
- *—in the Ivory Coast, where pilot studies in two sub-prefectures showed the many obstacles to introducing educational television and reaching the Plan targets in most of the northern and western areas of the country;*
- *—and in Iran, unless the government's regional development policies (particularly those concerned with amalgamation of village populations and expansion of the road network) are effectively carried out.*

III. Preparing for reform programmes

The aim of the present chapter is to review the main case studies underlying the school-map methodology conceived of as an instrument for reforming educational systems. It may as well be said at this point that the methodology is far from perfect; further studies are needed to sharpen and improve its techniques, and only experience can show to what extent these techniques themselves are valid.

1. Nepal: primary education in a poor country

Faced with the problem of giving all school-age children five, six or seven years of schooling certain countries, such as Tanzania, have admitted that primary schooling will not be universal for some years to come and must be reserved for part of the population only. Other countries, such as Nepal, have taken a different road, reducing the number of years of primary schooling so that most, if not all, children are guaranteed schooling. In Nepal it was judged impossible to achieve universal primary education unless the prevailing system was reformed. As a result, a national education plan was drawn up which proposed replacing the 5–3–2 system by a 3–4–3 system[1] from 1971 on; this would make it possible to increase the rate of primary school participation from 60.4 per cent in 1971 to 64 per cent by 1976.

How was such a reform programme to be implemented and by what means was the aim of the education plan to be achieved? Answers to these questions are rendered more difficult in view of the fact that conditions in Nepal do not lend themselves particularly well to the adoption of simple solutions.

As is true of its economic and social affairs, the school system in this Himalayan kingdom is decentralized throughout the 75 districts or *panchayats*. Each district is empowered to decide on compulsory and free education and to levy the necessary taxes for financing it. This new departure has been hampered by the poverty of the country and the limited means of almost the whole population; in 1971 only two districts had come out in favour of a universal free education. This, then, is the background to the government's decision to push for three years' schooling for all.

The broken nature of the country's physical relief, with a number of mountain

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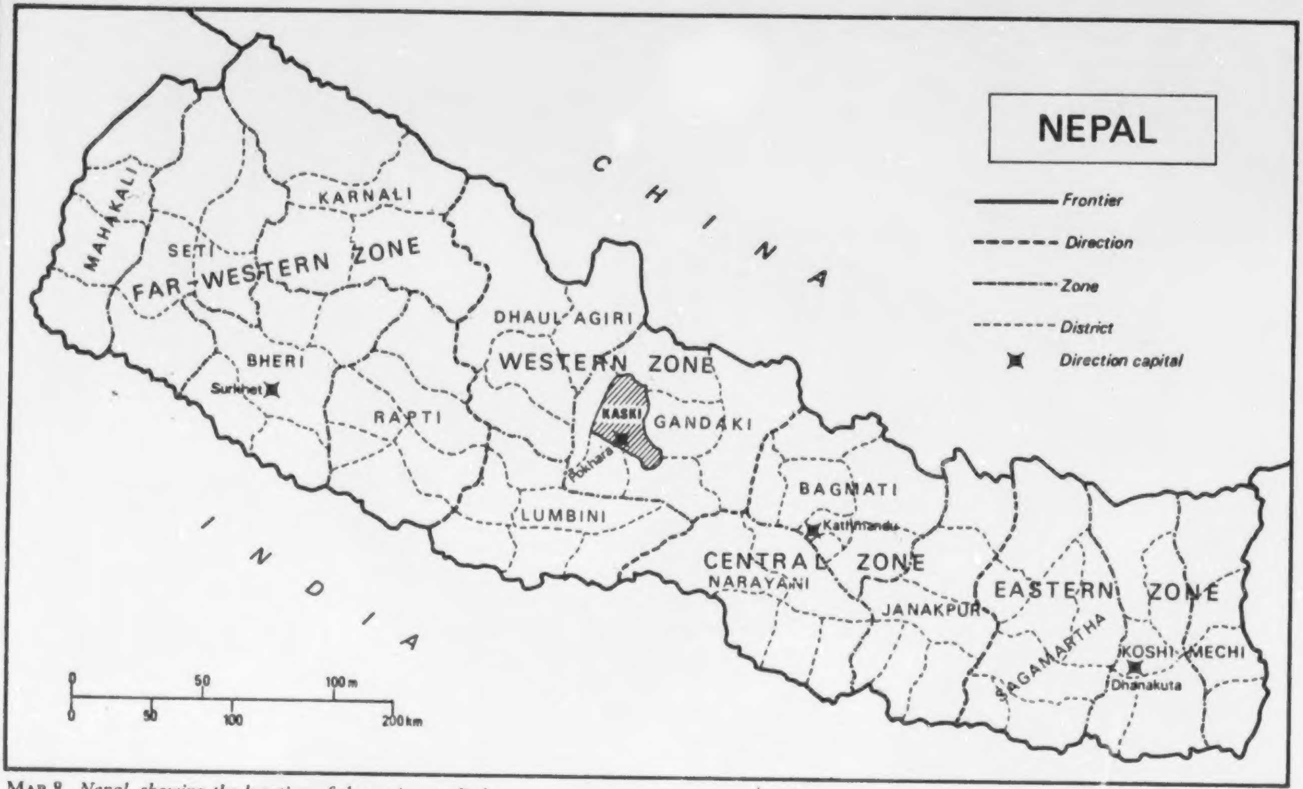
[1] Five years of primary schooling, three years of 'middle' school and two years of secondary school; three years of primary schooling, four years of 'middle' school and three years of secondary school.


NEPAL
Frontier
Direction
Zone
District
Direction capital
CHINA
INDIA
MAHAKALI
SETI
KARNALI
FAR-WESTERN ZONE
BHERI
Surkhet
RAPTI
DHAULAGIRI
WESTERN ZONE
KASKI
Pokhara
GANDAKI
LUMBINI
BAGMATI
Kathmandu
CENTRAL ZONE
NARAYANI
JANAKPUR
EASTERN ZONE
SAGARMATHA
KOSHI
MECHI
Dhanakuta
0
50
100m
0
50
100
200km

Map 8. *Nepal, showing the location of the region studied.*

chains rising to over 25,000 feet; the lack of roads (there are less than 900 miles of roads in this country of 54,400 square miles with a population of twelve million); the existence of several different languages and dialects, some of which are spoken only by a few hundred mountain-dwellers, constitute only a few of the obstacles which need to be taken into account in making any realistic forecast concerning the possibility of achieving the aims of the plan.

In contrast with Germany, where the pilot study was devoted to the least developed and most backward area (see Section 2 below), in Nepal it was decided to select one of the most dynamic areas and one that had opted for universal primary education, the district of Kaski (see Map 8).[1]

In 1971 12,800 children were attending the 160 primary schools in the district, 940 the 19 'middle' schools, and 3,640 the 21 full-course secondary schools. Girls accounted for 20 per cent of enrolments in primary schools and 12 per cent in secondary schools. The apparent participation rate, which has been calculated over a period of three years to take account of the reform contemplated, is relatively high at 60.4 per cent, but there are very wide variations, from 112.1 per cent in Pokhara to 30 to 35 per cent in some isolated localities. The drop-out figure is very low in the parts of the district close to Pokhara and very high elsewhere, particularly in the areas that have neither 'middle' nor secondary schools. The distances pupils have to cover, teachers' qualifications, teacher/pupil ratio, or the condition of premises and equipment, combine to illustrate the inequalities in educational facilities from one part of the district to another—a state of affairs which is confirmed by the corresponding difference in operational unit cost, which varies from 28 to 57.7 rupees.[2] In the light of this analysis of the situation, the authors set themselves four questions to be looked into with reference to the school map, namely:

(i) what was the best means of programming replacement of the 5–3–2 system by the 3–4–3 system while using the body of existing schools to best advantage and minimizing the economic, social, pedagogic and administrative difficulties?

(ii) could the national aim of 64 per cent participation for the 6 to 8 age-group in all parts of the district be adopted as it stood, or was it to be 'interpreted' in the light of the expansion possibilities of each area? And in what year could one expect universal primary education to be achieved?

(iii) to what extent would the weaknesses of the present school map, including the low participation of girls, the high rate of drop-outs, and the large number of unqualified teachers impede implementation of the reform?

(iv) from the practical and financial points of view, were the aims of the Plan feasible?

To help find answers to these questions, two schemes for the expansion of schooling, aiming at 73 and 100 per cent participation respectively for children of 6 to 8 in 1981, were drawn up. After an analysis had been made of the distribution of villages by number of inhabitants, of enrolment numbers in primary and middle schools, and of standards of teaching staffs, it proved possible to make a number of proposals for rationalization. What they will mean in terms of teaching-staff requirements and in terms of costs is shown in Table 4.

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[1] J. McCabe and N. R. Padhye, *Planning the location of schools: the district of Kaski, Nepal*, Paris, The Unesco Press, 1975.

[2] 10.56 rupees = 1U.S.$.

TABLE 4. Cost comparison of first and second schemes with present system (at current 1971 prices[1])

		Enrolm.	Teachers reqd.	Average p.a. salary NR	Total teacher cost NR	Total non-teacher cost NR	Total recurrent cost NR	Cost per pupil NR
1971: Pre-reform:	Level I (KG-V)	12 798	457	1 103.3	504 200	24 400	528 600	41.3
	Level II (VI-X)	4 576	248	2 663.0	660 424	135 260	795 692	173.9
	Total	17 374	705		1 164 624	159 660	1 324 292	
1976: First scheme:	Level I (I-III)[2]	8 124	447	1 103.3	493 175	25 957	519 132	63.9
	Level II (IV-X)	4 891	248	2 663.0	660 424	135 260	795 692	162.7
	Total	13 015	705		1 153 599	161 217	1 314 824	
1976: Second scheme:	Level I (I-III)[2]	12 982	447	1 103.3	493 175	25 957	519 132	40.0
	Level II (I-II)	7 796	311	2 663.0	828 193	169 630	997 823	128.0
	Total	20 778	758		1 311 368	143 673	1 516 955	

[1] For equal cost comparison 1971 salaries are used; non-teacher cost taken at 5 and 17 per cent respectively for first and second levels in costing the proposals, on the basis of costs shown in the original study (op. cit.).

[2] Level I covers pre-school and three years of primary school.

Rationalizing the school map results in a drop in unit costs in secondary education under both schemes, but on closer analysis, it is evident that scheme Number 2 is superior to scheme Number 1. For example, scheme Number 2 anticipates no reduction in primary school enrolments (something which it would be difficult to ensure acceptance of socially) and no increase in unit costs at primary level; even more significant, it demonstrates that with an extra 50 per cent of enrolments (20,778 as against 13,015) the extra current budget funds to be raised would amount to only 15 per cent (1.5 million rupees as against 1.3 million).

To sum up, the work on the school map for the Kaski district has revealed possibilities of implementing the reform in the most economic manner and has led to the conclusion that in this district participation goals should be more ambitious than the rates decided on nationally.[1] This shows how important the school map is for educational planning; its utility is not restricted to the phase during which the Plan is being carried out, it can be an instrument of prime importance both when targets are being set and when they are being 'interpreted' for school-district application.

2. Germany: from the vertical system to the *Gesamtschulen*

Teachers and educationists tend to distinguish between school systems on the basis of vertical and horizontal structure. The vertical-structure system, embracing several types of school, finds its justification in the argument that it is possible to divide children up in terms of ability into groups of lower, medium and higher level and to allocate them to the various categories of schools; the disadvantage of this type of structure is that children's futures are prematurely fixed and frozen. Inasmuch as a correlation exists between the social class from which children come and the kind of school they go to, some have come to the conclusion that vertical-structure systems promote social discrimination.

It is argued that the horizontal structure offsets or overcomes these disadvantages and for that reason, among others, it has been adopted in different places. Horizontal-structure systems operate on the assumption that it is advisable to avoid grouping children according to their capacity levels, and course-streaming takes place, therefore, at a much later stage.

If such structural reforms are initiated it is obvious that a very considerable reorganization of education supply must take place, since multiple school networks corresponding to the different types of school will need to be replaced by a single network of identical institutions. This means closures, conversions and new schools. Consequently, the school map is an essential instrument for putting through structural reforms of this kind; this was appreciated in France, where in 1962–1963 the drawing-up of school maps for first and second cycles of secondary education was decided on at the same time that structural reform was being initiated by the Government.

The present school system in the Federal Republic of Germany is of the vertical kind. After four years of primary school children go on to one of three categories

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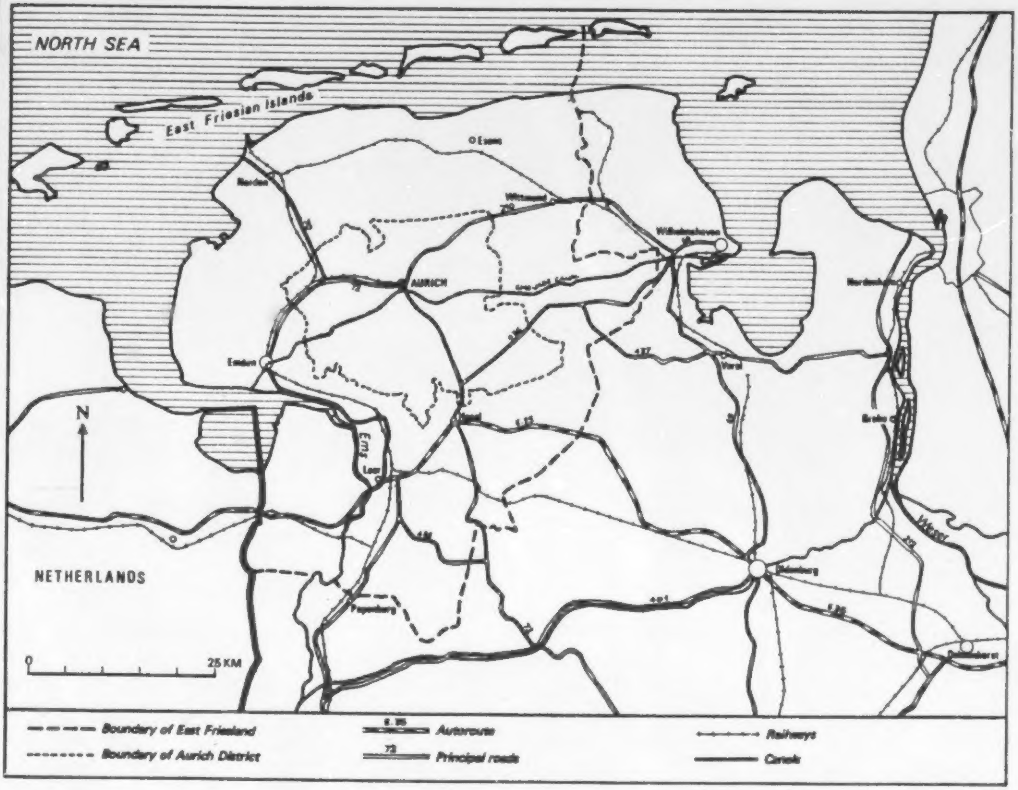
[1] This will probably not be the case in other districts, where the conclusions to be reached may be the opposite. In this connection one would hope that the Nepalese authorities will undertake further investigations in less developed areas, before proceeding to apply the pilot exercise to the country as a whole.


NORTH SEA
East Friesian Islands
Esens
Norden
Wittmund
Wilhelmshaven
AURICH
Emden
Ems
Leer
Varel
Nordenham
Brake
Oldenburg
Papenburg
Delmenhorst
Weser
437
401
E 35
72
N
NETHERLANDS
0
25 KM
Boundary of East Friesland
Boundary of Aurich District
E 35
Autoroute
72
Principal roads
Railways
Canals

MAP 9. *East Friesland in the Federal Republic of Germany, showing the location of Aurich.*

of school: either the *Gymnasium*, which is reserved for a very small proportion of the total and leads on to higher education, or the less selective *Realschule*, which leads on to full-time vocational schools and, in the case of a small number of the children concerned, to the *Gymnasium* (after six years), or, thirdly, the *Hauptschule*, with a five-year course designed for the majority of the children who are to attend part-time or full-time vocational school. Some of the *Länder* are thinking of replacing the present form of organization with a horizontal-structure system featuring a single type of school, the *Gesamtschule*: this is the case of Lower Saxony, for example.

In order to determine how a horizontal-structure system with central schools may be introduced, a pilot study[1] was devoted to pinpointing the chief features that need to be taken into account once the *Land* launches a reform programme. The desire to apply the findings of this research to countries less developed than Germany led to the investigation's being conducted in a rural area as little developed as possible. The district of Aurich in Eastern Friesland was chosen for this reason; it is an area whose underdevelopment may be characterized by the following statistics.

In 1970 population density was 133 inhabitants to the square kilometre, as against 248 for the Federal Republic of Germany; industrial workers in the area accounted for 3 per cent of total population, while in Germany as a whole the figure was 14 per cent; 19.8 per cent of wage-earners in Aurich were getting their living from farming, the average figure for the whole country being 8.9 per cent. The backward nature of the district in the matter of education is shown by the frequentation rates for *Gymnasium* and *Realschule*; 26 per cent of schoolchildren in class 7[2] were attending a *Gymnasium* or a *Realschule* in Friesland, as against 38 per cent in the country as a whole.

As part of the effort to help Eastern Friesland catch up, a regional development plan for the north-west of Lower Saxony makes available to Aurich and the areas adjacent to it federal investments for the development of industry, the tourist trade, agriculture and transport, under the 1965 Federal Law on Town-and-Country Planning (*Bundesraumordnungsgesetz*). In particular, the programme provides that the town of Aurich will function as a second-class centre, in other words that it will act as a centre for the entire district at least. All round it, a number of smaller parishes are to become third and fourth-class centres, specifically, Ostgrossefehn, Riepe, Uthwerdum and Wiesmoor. The map showing these centres is to foreshadow the map showing where second-level schools are to be located.

Consequently, the pilot study has a double aim: firstly that of accomplishing the preparatory work for the bringing-in of the school reform, and secondly that of integrating the school map with the town-and-country-planning and regional development maps.

As in the case of the other studies, the first stage is a critical analysis of the current school map, with its geographical unevenness in rates of admission to second-level schooling and rates of use made of premises, unevenness in the facilities which schools possess and in teaching standards, etc. One of the most

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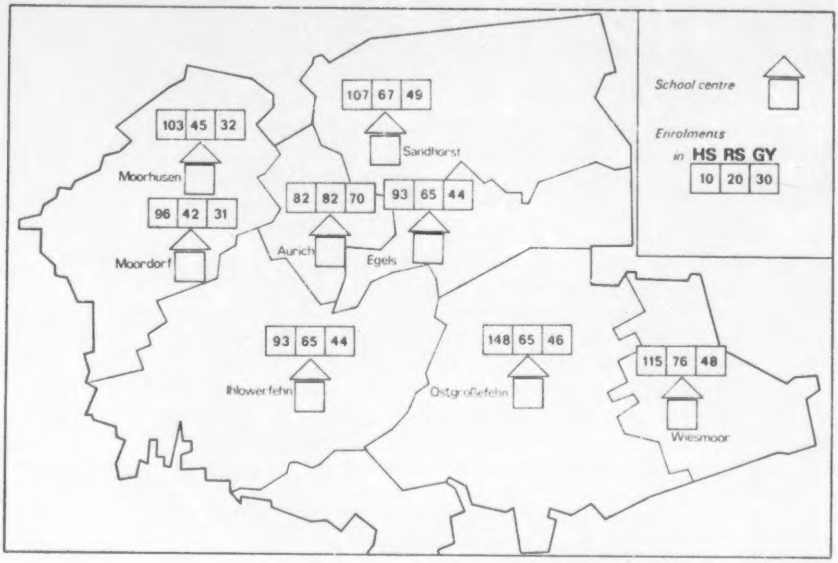
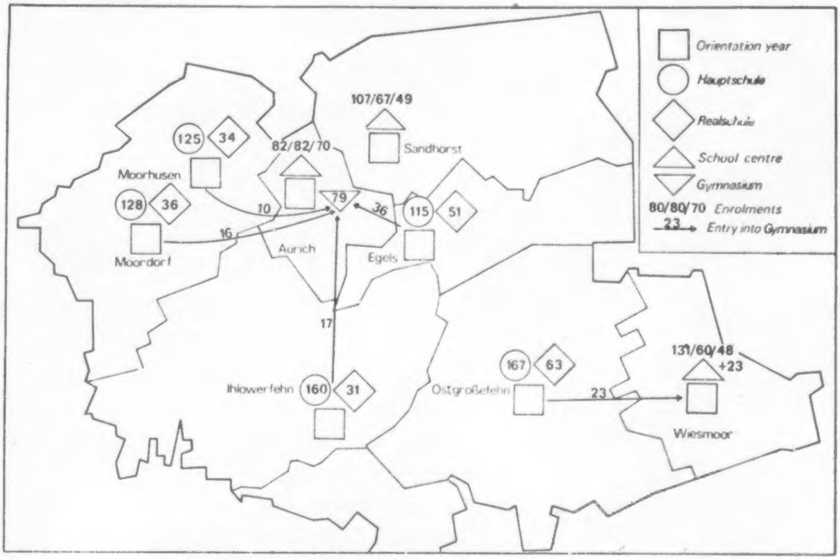
[1] H.-J. Back, B. Kirfel, N. Kulmsee and R. Martinsen, *Méthode de préparation de la carte scolaire: Aurich, Basse-Saxe, République fédérale d'Allemagne*, Paris, Unesco/IIPE, 1974.

[2] After primary school and the observation cycle.


107 67 49
Sandhorst
103 45 32
Moorhusen
96 42 31
Moordorf
82 82 70
Aurich
93 65 44
Egels
93 65 44
Ihlowerfehn
148 65 46
Ostgroßefehn
115 76 48
Wiesmoor
School centre
Enrolments
in HS RS GY
10 20 30

MAP 10. *The second-level school map for Aurich, 1980 (Hypothesis 1).*


107/67/49
Sandhorst
125
34
Moorhusen
82/82/70
79
10
36
115
51
128
36
16
Moordorf
Aurich
Egels
17
160
31
Ihlowerfehn
167
63
Ostgroßefehn
23
131/60/48
+23
Wiesmoor
Orientation year
Hauptschule
Realschule
School centre
Gymnasium
80/80/70 Enrolments
23 Entry into Gymnasium

MAP 11. *The second-level school map for Aurich, 1980 (Hypothesis 2).*

important conclusions reached as a result of this analysis deserves to be quoted: 'it is probably the non-existence of an organized school-transport system that accounts for large numbers of the district's children of school age not following the stream which leads to third-level education.'

After treating of the state of education supply in 1971, the report moves on to the prospects for expansion of the school system. Changes in the area's population have produced the result that the numbers of children of primary-school age appear to be stagnant or slightly in decline. As far as second-level enrolments are concerned, the prospects obviously depend on how rapidly the reform programme is implemented. A study has been made of two alternative schemes: (1) complete introduction of the horizontal-structure system by the end of a nine-year period (1980); (2) partial introduction of the horizontal system. The state of affairs in 1975 in the first case would be identical with the situation in 1980 in the second case.

Rates of admission to the first cycle are fixed in the light of the number of 'school centres' to be gradually set up in the course of the decade. In the case of the second cycle, once the admission rates approved by the Federal Education Planning Commission have been interpreted in relation to the present state of schooling in the area and the alternative reform programmes, it becomes possible to estimate enrolment numbers per year and per catchment area.

Finally, the future school map offers alternative schemes for rationalizing supply at horizon-year 1980. For instance, Maps 10 and 11 show the geographical distribution of second-level schools under two schemes: if the reform programme is completely implemented by 1980 (H1) there will be eight school centres to meet the district's demand for education; otherwise, under H2, children will be attending one of the five *Hauptschulen*, one of the five *Realschulen*, one of the three school centres, or the *Gymnasium* at Aurich. Costs will vary according to which scheme is adopted, and will be in the neighbourhood of 150 million DM. Neither the Aurich district nor the *Land* of Lower Saxony can finance projects of this nature on their own, and therefore one of the essential conditions for introducing the reform programme is financial support from the Federal Republic.

Two of the many conclusions to be drawn from the pilot exercise, are:

(a) that it has served to test how realistic the introduction of the horizontal system is from a financial point of view,

(b) that it has provided the elements of a methodology for drawing up the school map that is applicable to Lower Saxony and the other *Länder* thinking of adopting the horizontal system.

3. Costa Rica: a prior condition for nuclearization

For some years past, those in charge of school systems in Latin America have been referring to 'nuclearization'—a term which has been taken up by Peru, Colombia, Chile, Venezuela, and almost all the countries of Central America and the Caribbean area. Grouping schools into nucleos is a useful policy where the aim is to set up educational units which, by reason of their size, are better able to take advantage of improved teaching resources in the shape of teachers, headmasters, inspectors, materials and furnishings and equipment. The results are also of assistance to the administration and management of schools and help increase the effectiveness of school systems.

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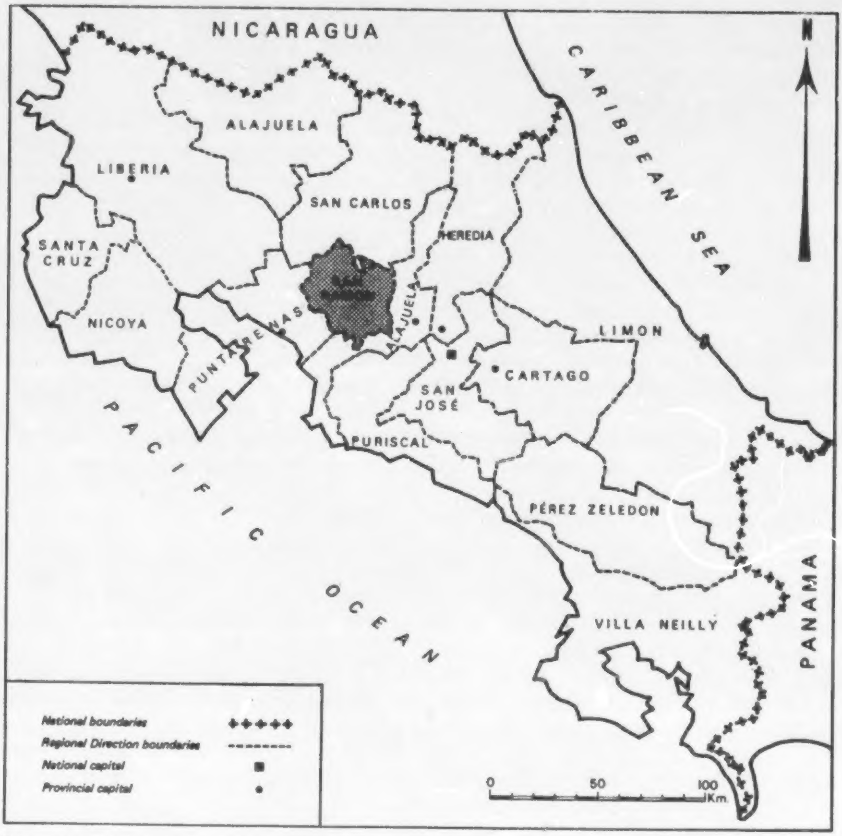
NICARAGUA
CARIBBEAN SEA
N
ALAJUELA
LIBERIA
SAN CARLOS
HEREDIA
SANTA CRUZ
NICOYA
PUNTARENAS
ALAJUELA
LIMON
CARTAGO
SAN JOSÉ
PURISCAL
PACIFIC OCEAN
PÉREZ ZELEDON
VILLA NEILLY
PANAMA
National boundaries ✚✚✚✚✚
Regional Direction boundaries --------
National capital ■
Provincial capital ●
0
50
100
Km.

MAP 12. *The Directorate of San Ramón, Costa Rica.*

However, nuclearization, despite its numerous theoretical advantages and its official adoption by so many countries, has so far remained something to be worked towards; as yet, there is no evidence of its having been effectively and satisfactorily achieved.

Given the widespread interest it has generated, and the part played by the school map in the setting-up of nucleos, it seems appropriate to provide a concrete example of how the nuclearization concept operates in practice.

Costa Rica, the small Central American country selected for this investigation, is quite certainly unrepresentative of the stage which education has reached on the American continent. It is, in fact, one of the most advanced countries insofar as the development of education is concerned. The schooling rate for children at the primary level is in the neighbourhood of 90 per cent, and almost the entire population is literate. None the less, the Costa Rican authorities are having to face problems little different from those of other countries; expenditure on education reaching record levels, disparities between one area and another in the matter of access to education, and low yields from educational systems. In 1971 the government introduced a considerable reform of the school system, which affected its structures, content and teaching methods. The extension of the compulsory schooling period from six to nine years[1] and the elimination of inequalities as between the various areas were taken as priority targets. To help implement the reform programme, a policy to amalgamate schools inside nucleos was proposed; however, a reorganization of the current school map is obviously necessary to make this policy work.

Such is the background to the investigation undertaken in close collaboration with the Costa Rican authorities, who were anxious to carry the school plan into effect and to make a success of the nuclearization policy.[2]

A pilot area, the directorate of San Ramón, was selected. It consists of four cantons and exemplifies the wide variations in physical relief and conditions of existence affecting the national population as a whole. The Directorate has 102 primary schools, 5 secondary schools and a teachers' training college.

In the first stage of the investigation, as complete a diagnosis as possible was made of the current school map. For this purpose the area was divided up into three sub-areas, urban, semi-rural and rural, with the object of identifying the effect of geographical factors on development and schooling conditions. At the outset, it was observed that schools in the urban sub-area are, on the whole, well served by a road network in good condition, but that conditions in the rural area are less favourable. Here, a number of schools have already closed down because of a falling-off in enrolment due to population movements and a drop in the birth-rate; moreover, connections between one school and another are poor because of a less than adequate road network. In response to the need for a more systematic analysis of the conditions in which schooling is provided, a number of indicators were adopted relative to the distribution of schools by size, actual provision of schooling and participation rates, location of pupils' homes and the distances they have to cover, retention rates, circumstances affecting teaching staffs, condition of school furnishings and equipment and, lastly, costs. The following are some of the findings reached:

(a) The primary-school map is characterized by a large number of small schools; half of them are situated in the rural sub-area and have on average 67 pupils. Little difference exists between one area and another in respect of the evolution of enrolments, but the supply situation shows significant variations. The large number of one-teacher schools and the predominance of the system whereby teachers work in more than one school in the rural area offer no guarantee that an adequate number of hours is taught or that an adequate teaching standard is reached. Again, the less than full use made of premises and teachers, and the low enrolment rate, make it impossible to obtain the necessary teaching equipment, specialized classrooms, and an effective inspectorate service. All of these difficulties help to explain the high rate of drop-outs experienced in these areas and the very rapid falling-off in participation rates at 11 and 12 years.

(b) The secondary-school map is not designed for mass education. Sixty per cent

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1. Cycles I, II and III, each lasting three years.
2. J. Hallak, F. Caillods, I. Brjeska and L. Secco, *Método de preparación del mapa scolare: la región de San Ramón, Costa Rica*, Paris, IIPE, 1975.

of those in the final year of primary school (class 6) go up into class 7 and only a very small proportion of children go on to the second cycle of second level, the so-called diversified cycle. The uneven geographical distribution of the schools, which are all to be found in the four towns of the area, means that there is a very great disparity in transition rates (11.6 for the rural area, as against 100 per cent in the chief town of the area).

In the second stage of the investigation an attempt was made to estimate the demand for education in horizon-year 1980, taking account of socio-economic trends and the structural reform of the school system. Here, it would seem that two opposed factors will influence the development of demand, namely, the lengthening of the period of compulsory schooling, which will now take in cycles I, II and III,[1] and the fall in the number of births since 1966, which will mean a reduction in the number of school-age children in the next decade.

In the final stage a number of formulas for the reorganization of the school map were considered, and their consequences evaluated.

(a) In cycles I and II, corresponding to primary education, a range of measures appropriate to actual conditions in the area were proposed; these provided for a modification of the boundaries of school districts, the closing-down and amalgamation of schools, school transport and nuclearization with rural, semi-rural and urban nucleos and super-nucleos. In all, it is anticipated that the number of primary schools, which was 102 in 1972, will go down to 59 in 1980, and that these will be re-organized in 15 nucleos. Despite additional capital costs and additional expenditure on teaching staffs in the nucleos, the proposals put forward would mean a saving of about 432,000 colones.[2]

(b) In cycle III it will be necessary to prepare a school map capable of absorbing enrolments to be multiplied by 2.2 between 1972 and 1980. If we compare the two possible solutions, the advantage of converting a number of primary schools into cycle III schools becomes clear.

Specification	*Alternative I*	*Alternative II*
	Putting a cycle III into each of the 16 primary nucleo centres	Making use of premises existing in 1972 (13 cycle III's)
Transport requirements (pupil/kms.)	3,622	7,492
Building requirements	16	13

In the light of this investigation of the San Ramón area, it may be concluded that nuclearization is possible in Costa Rica, but that it will involve a very considerable reorganization of education supply. School-map rationalization methods undoubtedly constitute a pre-requisite for bringing in nuclearization.

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[1] This formerly covered only cycles I and II.
[2] 8.75 colones = 1U.S.$.

The school map is an essential instrument when it comes to reforming education systems.

The reform of the school-system structure being envisaged by the government of Nepal appears to be a possibility in the Kaski district. But there are concrete problems to be resolved, for instance that of taking best advantage of the existing stock of schools; there are also difficulties to overcome, either of a social nature (e.g. schooling for girls) or of an economic nature.

Certain Länder *in Western Germany are thinking of adopting the 'horizontal' system of* Gesamtschulen *to replace the present 'vertical' system of* Hauptschulen, Realschulen *and* Gymnasiums. *The study carried out in the Aurich district in the* Land *of Lower Saxony shows that introduction of such a reform programme calls for financial resources exceeding the* Land*'s financing possibilities. The Federal government's rôle will therefore be crucial in the application of the horizontal system in Germany.*

The educational reform in Costa Rica affects education structures, contents, and methods, and proposes an amalgamation of schools in nucleos. The pilot study of the San Ramón area demonstrates that nuclearization is a possibility, but that it involves a major reorganization of education supply.

IV. Greater effectiveness from rationalizing the map

The examples provided in the foregoing chapters have shown that the school map makes educational planning a rational process by asking whether the plan's targets are attainable or not and by determining the essential preconditions for putting school reform programmes into effect. The present chapter will deal more specifically with the consequences which the rationalization of the school map has on the effectiveness of the resources voted for education.

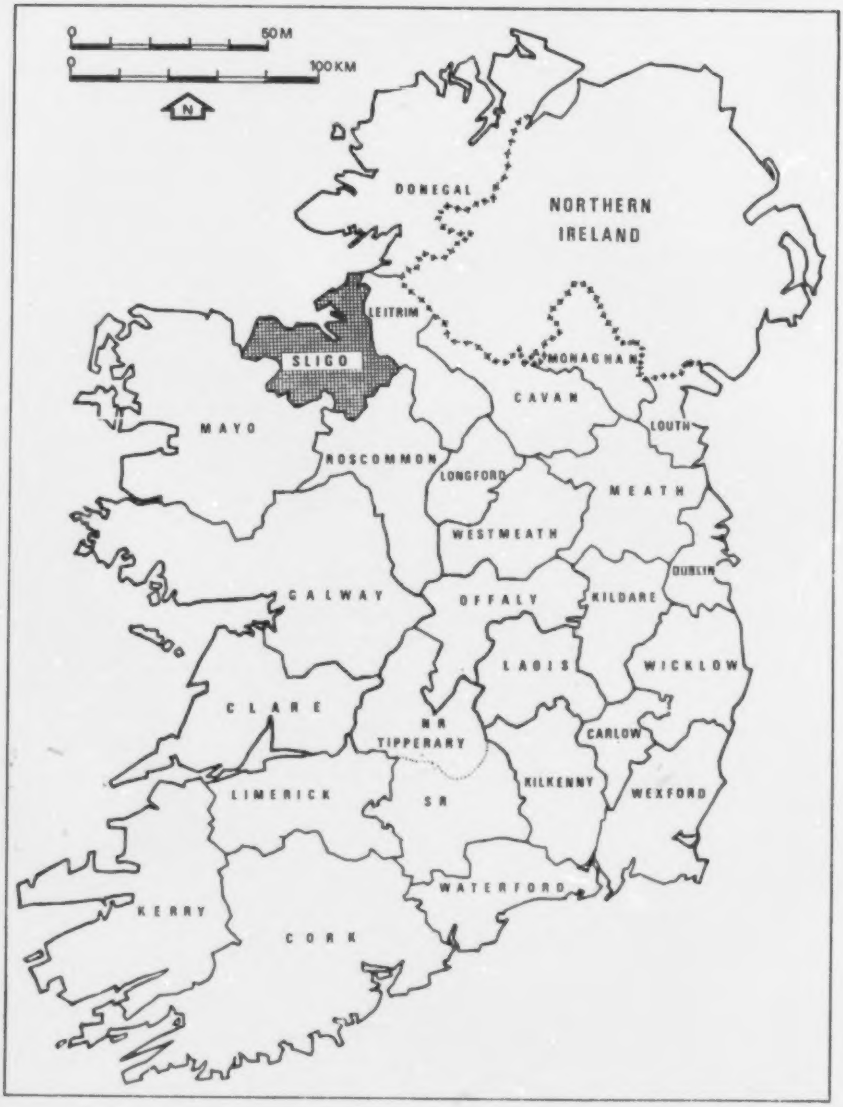
1. Ireland: modernizing school networks

Ireland was one of the first countries in Western Europe to employ advanced techniques in the planning of education, which, as can be seen from the organizational chart of the Department of Education, involves several of its sections. None the less, on the administrative side of the ministry, it is not an easy matter to establish exactly who is responsible for putting the school map into effect. An extensive enquiry was undertaken by the Ministry of Education in 1965/66 and it was decided that the question of the schools network and work on the school map were the concern of the central departments.

The department draws up principles and regulations to standardize the sizes of schools, decides on the amount of floor-space per pupil, the maximum permissible transport time for pupils (90 minutes), and the need to locate new schools in 'poles of development' with a growing population, as well as the policy of gradually phasing out single-teacher schools (minimum size for primary schools to be 75 pupils).

The report on County Sligo[1] examines how far in practice such national rules are being applied in a given area. County Sligo, on the northwest side of the island, is rural in character and its population is in sharp decline. Between 1966 and 1971 the population of Ireland increased by three per cent and the population of Sligo went down by two per cent. The school network set up in the middle of the 19th century, at a time of high rural population density, now needs to be re-organized to take account of the demographic facts of the present day. This is a situation not uncommonly met with in European countries; the progress of industrialization and accelerated urbanization has meant a sharp drop in rural

[1] J. Hallak and J. McCabe, *Planning the location of schools: County Sligo, Ireland*, Paris, Unesco/IIEP, 1973.


0
50M
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N
DONEGAL
NORTHERN IRELAND
LEITRIM
SLIGO
MONAGHAN
CAVAN
LOUTH
MAYO
ROSCOMMON
LONGFORD
MEATH
WESTMEATH
DUBLIN
GALWAY
OFFALY
KILDARE
LAOIS
WICKLOW
CLARE
NR TIPPERARY
CARLOW
LIMERICK
SR
KILKENNY
WEXFORD
WATERFORD
KERRY
CORK

MAP 13. *Ireland, showing the location of County Sligo.*

population and made the school networks of over a century ago out of date. What has been learnt in Ireland, thanks to the Sligo investigation, indicates that school-map methodology is an essential instrument for bringing about the modernization of school networks.

The Sligo case study begins with a very detailed examination of school attendance by sex, age and catchment area, examines disparities in schooling in the different areas and then proceeds to analyze the county's demographic and economic development from the point of view of the past and the future. This serves as a basis for an explanation of the characteristics of the county's schooling system in 1971 and provides a foundation for rationalizing the map during the next ten years.

While some of its findings are of exclusively local relevance, the case study does go a long way towards providing a picture of actual conditions throughout Ireland as a whole and in a good number of other countries. It will be useful, therefore, to recall some of the conclusions drawn.

(i) Even when a country introduces regulations on standards for running schools, there is no guarantee that the standards will be complied with. The county has 107 primary schools, and 76 of them do not meet the conditions laid down for the running of primary schools. The secondary-school network does not comply with the requirements laid down by the Ministry of Education. Overall, most of the first- and second-level schools are inefficiently run and suffer from an accumulation of shortcomings, including small size, inadequate standards of hygiene, premises ill-adapted and under-occupied, lack of maintenance and inadequate teaching staff.

(ii) But even such a gloomy picture of the school map has its gradations: alongside areas of complete darkness one finds areas of shadow and in places bright light floods in. What sort of school the pupil attends depends on whether he lives in a rural area, in a village or in a town. He will have more school gardens round his school, more sports-grounds, more school equipment and supplies, he will enjoy better-qualified teachers and so on, if he lives in Sligo, the county capital, than if he lives on a farm 25 miles away to the south-east. Moreover, in Sligo he will be able to take the course of studies he prefers whereas in a rural area he will have to accept whatever courses are being taught. And lastly, attending school will involve transport problems or not, as the case may be. It consequently comes as no surprise that participation rates for 17- and 18-year-olds can vary from eight to 73 per cent according to locality. Inequalities in educational 'supply' are responsible for these variations in school attendance at first and second levels.

(iii) These inequalities have not arisen by chance; they have historical, economic and social ramifications, and areas which once enjoyed a degree of prosperity may still possess schools no longer justified by their present position in the county.

Population developments in each part of the county are the best indicator of unevenness in supply. Loss of population in some areas and consequent gain in others results in under-occupation of school premises in the former, and overcrowding in the rest. For example, premises and facilities are being utilized to the extent of 143 per cent in the small town of Tubbercurry even though 40 per cent of the town's children are taken every day to another town, Benada, several miles away; none the less, the equipment available in Benada is still under-utilized. This is because the population of Benada is declining, while that of Tubbercurry is rising rapidly.

(iv) The structure of the schooling system, the mass of regulations concerning the admission age, the number of years of compulsory schooling, and the ways in which selection is carried out, can all be used to organize educational supply and their overall effect on the school map is quite evident.

(v) The weight of religious and historical tradition and its consequences for the distribution at local level of administrative and managerial powers are factors which determine the greater or less consistency and rationality of the school network.

(vi) The boundaries of catchment areas have to be redrawn to bring them into line with the standards laid down for catchment areas (secondary-school enrolments of 400 to 800 pupils) and to help achieve the aim of levelling-out educational supply in the various parts of the county.

(vii) When proposals are made for rationalizing the school map (and this means closing one out of every two primary schools) a comparison must be made between the costs and advantages of the various solutions possible. Such comparisons have led to a questioning of the advisability of a number of nationally approved standards; for instance, there is no reason to assume that the minimum size for a primary school must be fixed at 75 pupils, since it may be perfectly justifiable to maintain schools with between 30 and 75 pupils in some areas. The proposals made for rationalization will mean very substantial savings in costs, even assuming that some single-teacher schools are kept going.

These conclusions confirm that the school map is of vital importance when it comes to modernizing school networks in the context of population developments and the aims set out in schooling plans.

2. Morocco: urban-area schools

It is generally accepted that expansion of schooling facilities is usually of benefit initially to the urban areas which, in most countries, monopolize the best furnishings and equipment and have the finest schools and the best-qualified teachers. Also, although schooling for girls never reaches the figures for boys, it takes place on a large scale, and mainly in the most go-ahead towns and cities where school participation records are being broken.

However, a close examination of schooling in some of the major metropolitan centres gives the lie to what we have just said. Teheran, Dakar, Tokyo, Sao Paulo and other capitals are at grips with difficult problems in their struggle to meet local schooling requirements, and municipalities have no hesitation in hiring residential premises or offices and turning them into schools. Some classrooms are not fully occupied and others are so overcrowded that the double-shift system has had to be adopted. Moreover, it is clear that the disadvantages of short-duration schooling in ill-adapted premises more than offset the relative advantages of cities and towns with their supply of qualified teachers.

These apparent contradictions show how specific are the situations which an urban school map has to deal with and the difficulty of arriving at general conclusions in using it. Inappropriate school maps have resulted from the lack of a consistent system of town planning, including the socio-cultural infrastructures of which the school is an essential part; in other instances, despite the existence of a planning scheme for the town or city area, decisions are taken from day to day in response to the demand of the moment. There are even cases where the expansion of the town or city stops earlier than expected or goes on at an uncontrollable rate and gives rise to intense land-speculation; where the latter occurs, capital costs for schooling purposes end up out of all proportion to the funds provided. Every case turns out to be a unique one, even if the problems of adapting the urban school map are the common lot of those in charge of planning in almost every country in the world.

The Casablanca school-map study was undertaken to illustrate this state of affairs.[1] Casablanca is the Moroccan commercial capital and has within its boundaries one-fifth of the country's industrial and commercial apparatus; the city's population has gone up by more than 50 per cent in the space of ten years, from 960,000 in 1960 to 1,506,000 in 1971. Its population accounts for 9.8 per cent of the country's total population, but school enrolments account for about 20 per cent of all primary-school enrolments and 25 per cent of secondary-school enrolments in the country. Casablanca consumes 33.5 per cent of all the electric power produced and has 33.7 per cent of all the service stations to be found in Morocco. Its volume of port traffic accounts for 77 per cent of all goods handled in all Moroccan ports combined.

The built-up area has expanded very rapidly and is spreading out more and more on the outskirts, where the annual rate of population growth is as much as 6 per cent, and sometimes more. Getting people settled in the new quarters is a question not merely of housing but also of overcoming problems in connection with street-laying, administrative facilities and services, health services and schools. Requirements must be exactly programmed, and in the town-planning schemes adopted the plots of land allocated for the building of schools need to be very precisely indicated.

In the older quarters of the city the provision of socio-cultural facilities gives rise to even more difficult problems. On the one hand, accelerated urbanization in the city centre, resulting in a population density of tens of thousands of people per square kilometre, has shown up the present-day inadequacies of schooling facilities provided in the past for a population of lower density. On the other hand, as in all towns and cities on the shores of the Mediterranean, close contacts exist between parents and their neighbours, with the result that schooling standards come under continuous and close scrutiny. The results achieved by certain schools are compared with those achieved by others and a genuine competition arises in regard to the remodelling and improvement of school facilities designed many years previously to meet other requirements and serve other purposes. In the old quarters, in general, schooling facilities are quantitatively inadequate and qualitatively ill-adapted, available land is scarce if not non-existent, and financial resources are very limited.

To show how the school map should be drawn up and solutions found to these problems, it was decided to concentrate the study on Ben M'Sik, a quarter still under development, and New North Medina, an old quarter short of facilities, and in this way to demonstrate how those in charge of the Casablanca school map are tackling the work of finding solutions to primary-schooling problems in two contrasting parts of the city.

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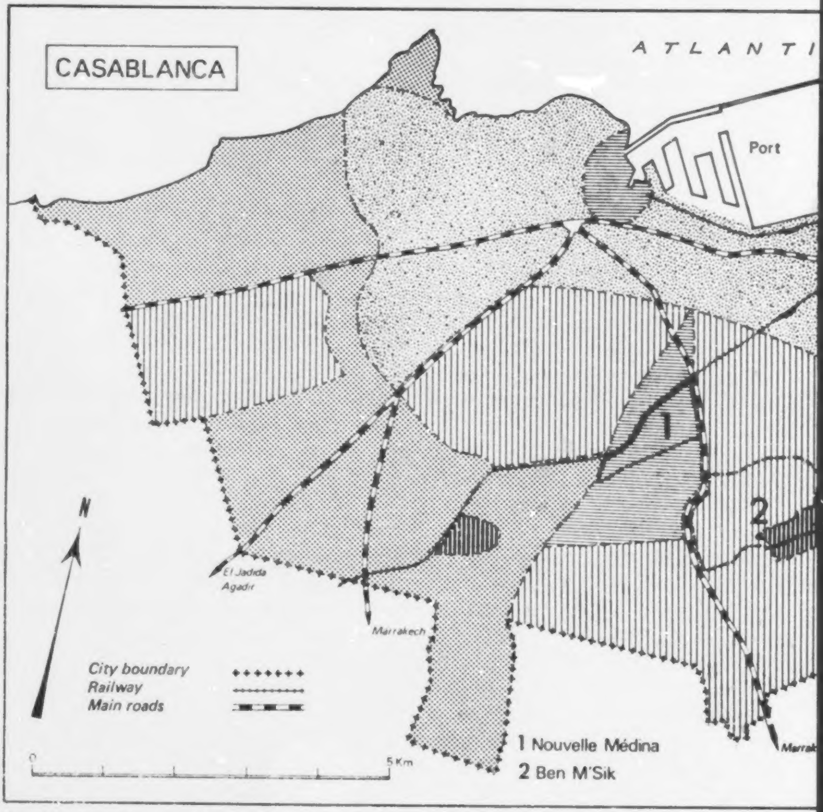
[1] G. Porte, 'La carte scolaire de l'enseignement primaire à Casablanca', in G. Porte *et al.*, op. cit.



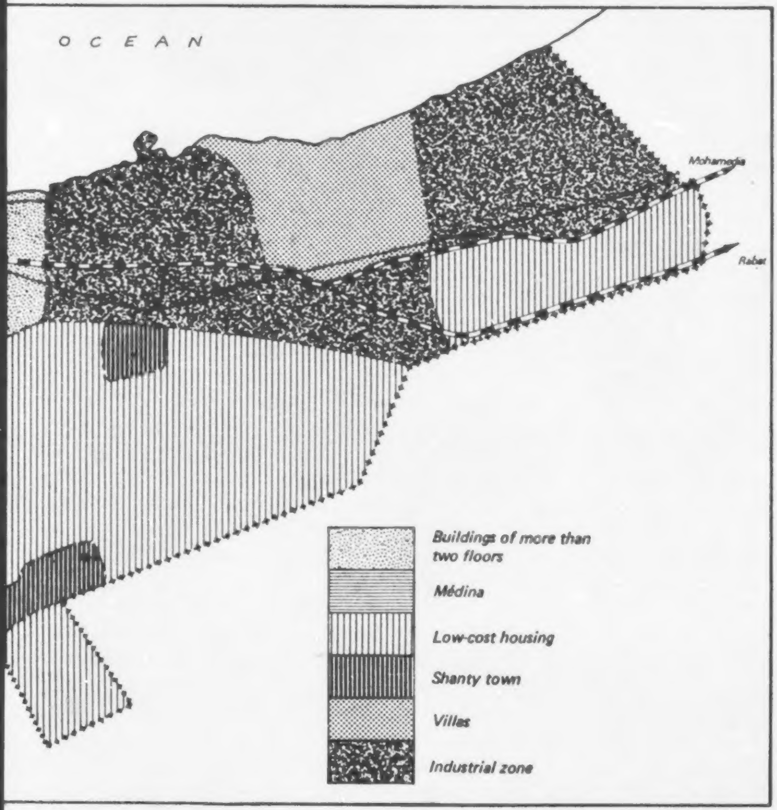
MAP 14. *Casablanca, Morocco, showing the type of habitat and the two quarters studied.*

Long-, medium- and short-term studies were undertaken, and in the case of long-term forecasting these parameters were adopted:

(i) pedagogic imperatives and the 'standardization' of pupil flows, (ii) developments in population in the context of the prospects for city growth, and (iii) town-planning, on a basis of 'neighbourhood units' representing 7,500 people in an area of 14 hectares, 'community groups' consisting of six neighbourhood units, and 'urban units' consisting of four community groups.

After surface-area-per-pupil norms and standard pedagogic and demographic pyramids had been applied, it was agreed with the town-planners that eight to ten thousand square metres had to be reserved for a primary school in each neighbourhood unit. From 1963 onwards this has been the basis of planning for all new quarters of the city and, in particular, for the Ben M'Sik quarter.

Medium-term analysis calls for an examination of the facilities programming envisaged in the long-term study. If one takes administrative delays and delays over building materials into account, medium-term forecasting relates to a date approximately 18 months before the functioning of the premises in question, while



an advance period of two years, the normal duration of the training course, must be contemplated in connection with recruitment for the regional teachers' training colleges. Finally, short-term work mainly corresponds to material organization for the beginning of the next school year, with all the necessary adjustments and changes that have to be made in existing medium and long-term forecasts.

The Ben M'Sik quarter, which was the subject of the first case study, grew up gradually between 1950 and 1967, when the final development project was launched. It includes an area of primitive housing with 11,679 shanties, and 6,961 one- or two-storey houses of solid construction. Population is increasing at the rate of 5.6 per cent a year and stood at 103,150 in 1972, a large portion of this total being accounted for by immigrants from southern Morocco. Economically, the quarter is a very poor one, with three quarters of the working population unemployed. Facilities for general, health and school purposes are lacking, and despite an education development map for six neighbourhood units, providing for six schools which are at present under construction, the problem of schooling for children in the condemned shanty town has not yet been resolved. It was impossible to build prefabricated schools because they are expensive and require too much land; as a result, a shift system was adopted in almost all the schools in the quarter; children who could not be accommodated were assigned to other quarters of the city, or taken care of in small numbers in private schools. However, at some time in the future when the shanty-town has been levelled, a plan for the still undeveloped western part of this peripheral quarter will make it possible to provide for three schools, with 93 classrooms, and in this way the needs of Ben M'Sik will be met.

The state of affairs in New North Medina is vastly different. Here, we have the same number of inhabitants as in Ben M'Sik, living in an old quarter on less than 100 hectares, as opposed to 250 hectares in the case of Ben M'Sik. Population, it is true, is increasing at the rate of only one per cent a year, but density is already two and a half times higher than in Ben M'Sik.

General facilities are satisfactory, with water and electricity laid on, tarred roads, hotels, service stations, etc. On the other hand, schooling facilities are quite inadequate. In 1960, with the quarter entirely developed, two of New Medina's four sectors had no school at all, whereas if prevailing standards had been complied with these sectors should have had six schools. In all, the 51 classrooms available amount to hardly 10 per cent of the 504 classrooms required. Since 1960, however, the acquisition of land reserved for other purposes, e.g. the municipal market, the public square and the mosque, together with the purchase of land at very high prices, has made it possible to bring about a considerable improvement in the situation, and 134 classrooms were available in October 1972. The school map of the quarter has been improved mainly by taking whatever land was available, putting up prefabricated classrooms alongside existing school buildings or adding further storeys to available buildings. The private sector, by taking in 12 per cent of the quarter's children, has played its part in finding a solution to the schooling problem, at least in the short term. None the less, in the long term (horizon-year 1980), even if one assumes a general application of the shift-system in the State sector, and control of private education supply, 120 new classrooms will have to be provided in an overcrowded quarter where land is non-existent. The author of the study compares a number of possible solutions: with or without shift-system, schools with several floors (solution 2), more traditional buildings (solution 1), erection of schools outside the quarter with school-bus service (solution 3). Each solution is considered from the point of view of costs (see Table 5) and the advantages offered. The final decision, of course, is in the hands of those in charge of Casablanca's education system, but the main interest of this study is that it shows the part which school-map methodology can play in rationalizing the process of decision-taking as regards education supply in urban areas.

TABLE 5. Comparative costs involved in various solutions

Solution	Capital cost per year and per inhabitant		Remarks
	With shift-system	Without shift system	
1	10.54	68.65	
2	3.63	15.62	
3	3.54	13.96	Plus the cost of transport to be provided

3. Lebanon: reducing costs through schools amalgamation

In most developing countries there has been increased social pressure for education in the last ten years. Those in charge of education have had recourse to all sorts of expedients in their efforts to meet this increasing pressure; they have tolerated or supported a private education sector which has acted as a safety valve in taking in children who could not be accommodated by the State sector; they have improvised school centres in residential accommodation with rudimentary furnishings and equipment; they have tolerated a proliferation of small schools with low enrolment figures in the villages, and there has been a massive recruitment drive for more highly qualified teachers, etc. As a rule, the result has been a real deterioration in teaching standards; schooling has proved to be very expensive because of under-utilization of available pupil-places, and unusually high teacher/pupil ratios have followed from the smallness of some of the premises used; or again, schools are built in the wrong places and State and private systems are found to exist side by side.

This very gloomy picture of the schooling situation is not peculiar to Lebanon—far from it; what is significant, however, is that this is a country which (until the events of 1976) had been endeavouring to improve schooling conditions by means of a 'schools amalgamation' project using school-map techniques. Consequently, the course of events in the Lebanon is of particular interest to other countries.

As the authors of the study point out, the development of the education system in the Lebanon is a function of historical accident, tradition, and the Lebanese attitude towards school attendance rather than the result of any particular national will for individual, social and economic development. The absence of precise targets or education plans means that at present there are a number of unevennesses within the education system, with the following consequences:

(a) 70 per cent of the teachers in the State system, and the great majority of those in the private sector, are insufficiently qualified;

(b) 86 per cent of schools are located in residential accommodation and 90 per cent of them have no playing yards or fields;

(c) there is an almost complete lack of teaching equipment;

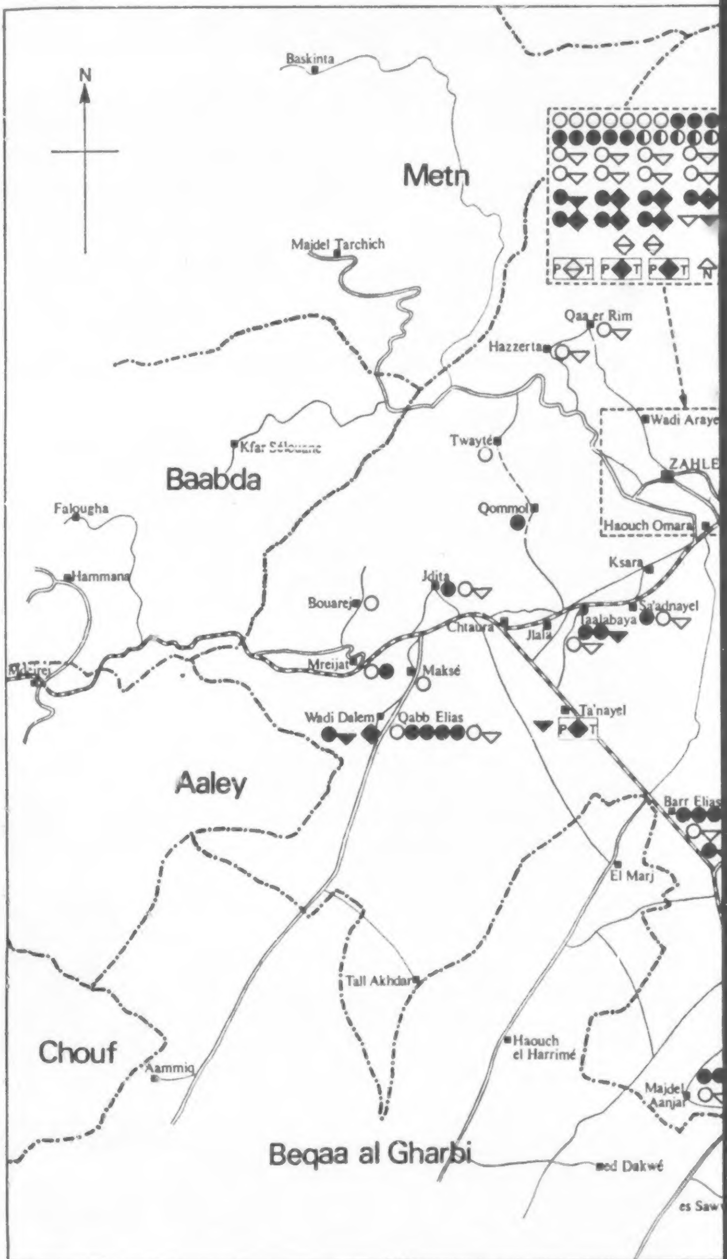
(d) the pupil/teacher ratio is 21 for the country as a whole but does not exceed 10 to 15 in scores of schools;

(e) there is a high percentage of under-occupied, and of overcrowded, premises.

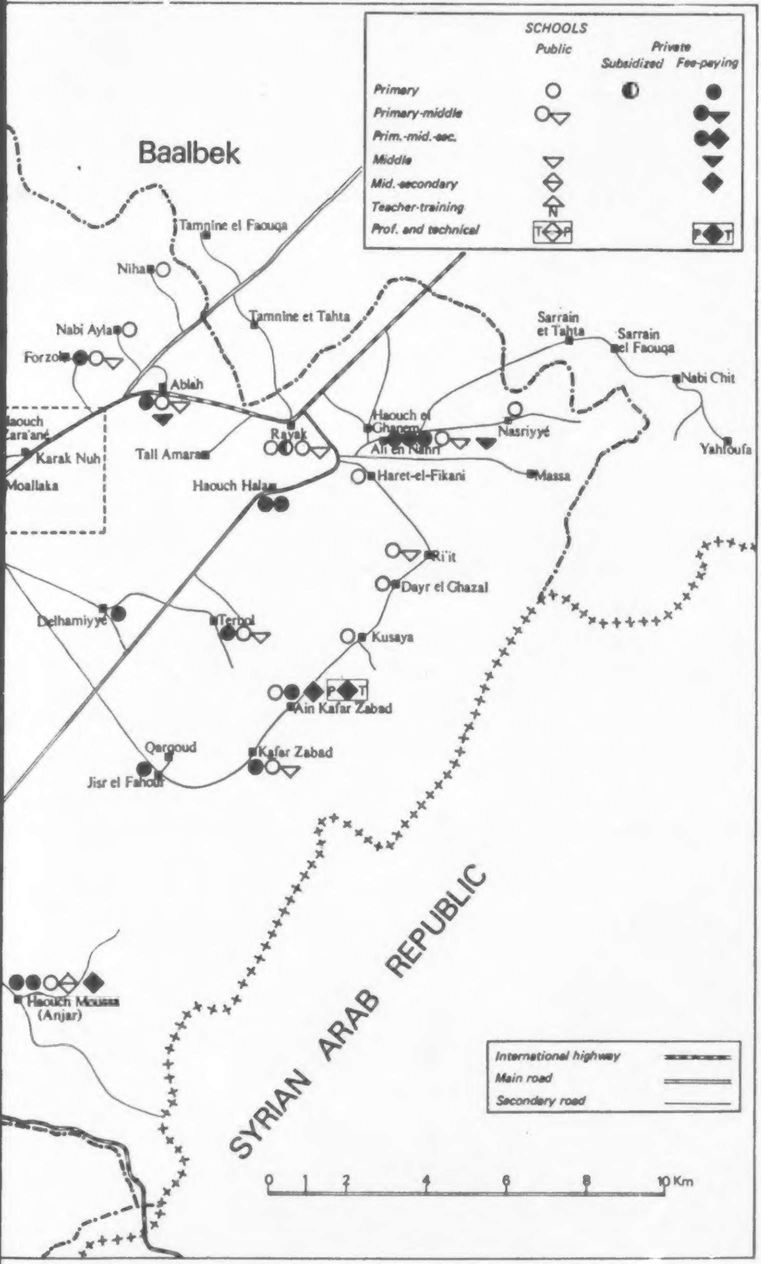
This state of affairs has led those in charge to look into the possibilities of a school-map rationalization project aimed at establishing a network of schools, primary and middle, standardized in size, modern and well-equipped, in urban built-up areas and in 'central villages' in the rural areas. The network to be set up would mean an amalgamation of existing schools; those in the centres would increase in size, and small ones would be closed down. Such a new school map would make it possible to meet schooling requirements over the next fifteen years, effect improvements in schooling conditions, and reduce expenses as the result of a more workable pupil/teacher ratio (e.g. 35 to 40, instead of 21 as at present) and greater use of premises and equipment.

The schools amalgamation project comprises several stages, as follows:

(a) collection of data on population and schooling in the various administrative


N
Baskinta
Metn
Majdel Tarchich
Qaa er Rim
Hazzerta
Wadi Araye
ZAHLE
Haouch Omara
Kfar Sélouane
Baabda
Twayté
Qommol
Falougha
Hammana
Ksara
Jdita
Bouarej
Sa'adnayel
Chtaura
Jlala
Taalabaya
Mdeirej
Mreijat
Maksé
Ta'nayel
Wadi Dalem
Qabb Elias
P T
Aaley
Barr Elias
El Marj
Tall Akhdar
Haouch el Harrimé
Chouf
Aammiq
Majdel Aanjar
Beqaa al Gharbi
ed Dakwé
es Saw

MAP 15. *The Caza of Zahlé, Lebanon, showing the school network in 1973/74.*


SCHOOLS
Public
Private
Subsidized
Fee-paying
Primary
Primary-middle
Prim.-mid.-sec.
Middle
Mid.-secondary
Teacher-training
N
Prof. and technical
T
P
P
T
Baalbek
Tamnine el Faouqa
Niha
Tamnine et Tahta
Nabi Ayla
Forzol
Ablah
laouch
Zara'ané
Karak Nuh
Moallaka
Tall Amara
Rayak
Haouch Hala
Haouch el Ghanem
Ali en Nahri
Nasriyyé
Sarrain et Tahta
Sarrain el Faouqa
Nabi Chit
Yahfoufa
Haret-el-Fikani
Massa
Ri'it
Dayr el Ghazal
Delhamiyyé
Terbol
Kusaya
P
T
Ain Kafar Zabad
Qargoud
Kafar Zabad
Jisr el Fahour
Haouch Moussa (Anjar)
SYRIAN ARAB REPUBLIC
International highway
Main road
Secondary road
0
1
2
4
6
8
10 Km

districts and by means of special enquiries made by the inter-ministerial working party in charge of the project;

(b) drawing-up of a first proposal by *cazas*[1] to determine the location of new schools. This should be done by those principally concerned, including the head of the regional education office, the school inspectors in each region and a multivalent team from the Ministry for Planning;

(c) on-the-spot visits and checking of proposals for location of schools, followed by amendment of the first map and the drafting of a pre-project;

(d) submission of the pre-project to local administrative authorities (heads of local councils, districts and regions) and modification of the pre-project in the light of their comments;

(e) fixing of standards for school buildings by an inter-ministerial team and promulgation of these standards by a decree of the Council of Ministers.

In short, the Lebanese 'schools amalgamation project' is the result of a number of steps involving successive testing of what has been done by school-map experts in the light of actual local conditions, followed by readjustments to take stock of the reactions of those speaking for the regions. It seemed appropriate, in other words, to take one typical area, the Zahlé *caza*, to show how the school map was drawn up in practice for the entire country. The ensuing study was made at IIEP request by those who were the principal artisans of the schools amalgamation.[2]

In virtue of its geographical, demographic and economic characteristics and its conditions of schooling, the Zahlé *caza* is quite representative of the country as a whole. Physical relief is varied; the population is split among various religious persuasions, with a number of religions divided still further into different sects; the economy is predominantly agricultural and several State and private school systems co-exist, in addition to which each creed has its own educational institutions.

The diagnosis made of education in the *caza* reflects the state of affairs in the country as a whole. A list was drawn up to record insufficiently occupied school premises, funds wasted because of the existence of both State and subsidized private schools, lack of basic furnishings and equipment and the size of requirements in the matter of qualified teaching staff. The diagnosis also brings out the parallel between the map of inhabitants by creeds and the map of schools by organizing authority. Finally, the analysis made of costs in the various education systems gives rise to the expectation that some of the private schools will close down as time goes on because, with expenditure considerably exceeding the funds available, they can no longer make ends meet.

By drawing upon enrolment forecasts and making some assumptions about the way the private sector will have developed by horizon-year 1980, the authors have succeeded in outlining a proposal for a school network that complies with national standards for school size (see Table 6). In deciding on the location of schools, account is taken of the road network and of the limits on distances children have to travel. The rationalization proposals involve the closing-down of nine primary schools and five middle schools and the building of 47 new ones. This makes it a school-map project with capital costs that are particularly heavy

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[1] A *caza* is an administrative division of the size of a French *arrondissement*.

[2] E. Khoury, A. Chemaitelly, E. Wardini, K. Abou-Rjaili, M. Zaatari and H. Hajjar, *Méthode de préparation de la carte scolaire: le caza de Zahlé, Liban*, Paris, IIPE, 1975. (N.B. This study was carried out in 1973–74.)

TABLE 6. School-size standards

Cycle	Small		Medium		Large	
	Number of class-rooms	Number of pupils	Number of class-rooms	Number of pupils	Number of class-rooms	Number of pupils
Primary	6	240	12	480	24	960
Middle	8	320	14	560	28	1120
Secondary	8	320	14	560	28	1120

for a small area like Zahlé. None the less, those in charge hope to see capital cost rapidly set off by savings in current expenditure and they justify the radical measures they are taking by pointing to the need to improve the standard of schooling in the *caza*. Other countries may prefer not to take such rapid steps in rationalizing their school map because they anticipate difficulties in finding the initial capital required. On the other hand, there is no reason why they should not take a lesson from what (prior to 1976) was planned to be done in Lebanon and strike a balance between costs and the advantages offered by different formulæ in deciding on the rate of rationalization of their school maps.

By rationalizing the geographical distribution of supply, it is possible to increase the impact of resources voted for education. This is demonstrated by the following reports:

(i) that on County Sligo, Ireland; the proposals put forward led to very substantial savings in costs;

(ii) that on Casablanca, Morocco; a close examination of the six formulæ for providing education supply in horizon-year 1980 shows that the amount of capital investment per inhabitant can vary very widely, in fact from 1 to 20;

(iii) that on the Zahlé area of Lebanon; it appears that savings made on current expenditure would offset the cost of capital investment called for by the rationalizing of the network.

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V. Factors influencing supply and demand

Before the methods of drawing up the school map are discussed, it may be appropriate to examine the part played by environmental conditions in determining the geographical distribution of schools and, conversely, the effect which the school map has on the way education develops, in other words, the relationship between education supply and education demand.[1] Can an explanation for the differences in school participation rates from one area to another be found in the imperfections of the map? Can the unevenness seen in the geographical distribution of schools be justified? Is the opening-up of schools a sufficient guarantee that they will work and be attended? What limitations imposed by environmental conditions have to be taken into consideration when the school map is being programmed? And so on. There are no standard answers to these questions, and in any case they vary in function of whether the matter at issue is education in rural areas or in towns and cities We shall, therefore, look in turn at the problems of the school map in rural and urban areas. However, at the outset something should be said about a particularly important aspect of educational planning revealed by the school map, namely unevenness.

1. Unevenness in provision of schooling

The school-map studies show that level of development and the amount of schooling provided in a country vary from province to province, and even from area to area inside each province. Map 16 illustrates this in the case of the Ivory Coast

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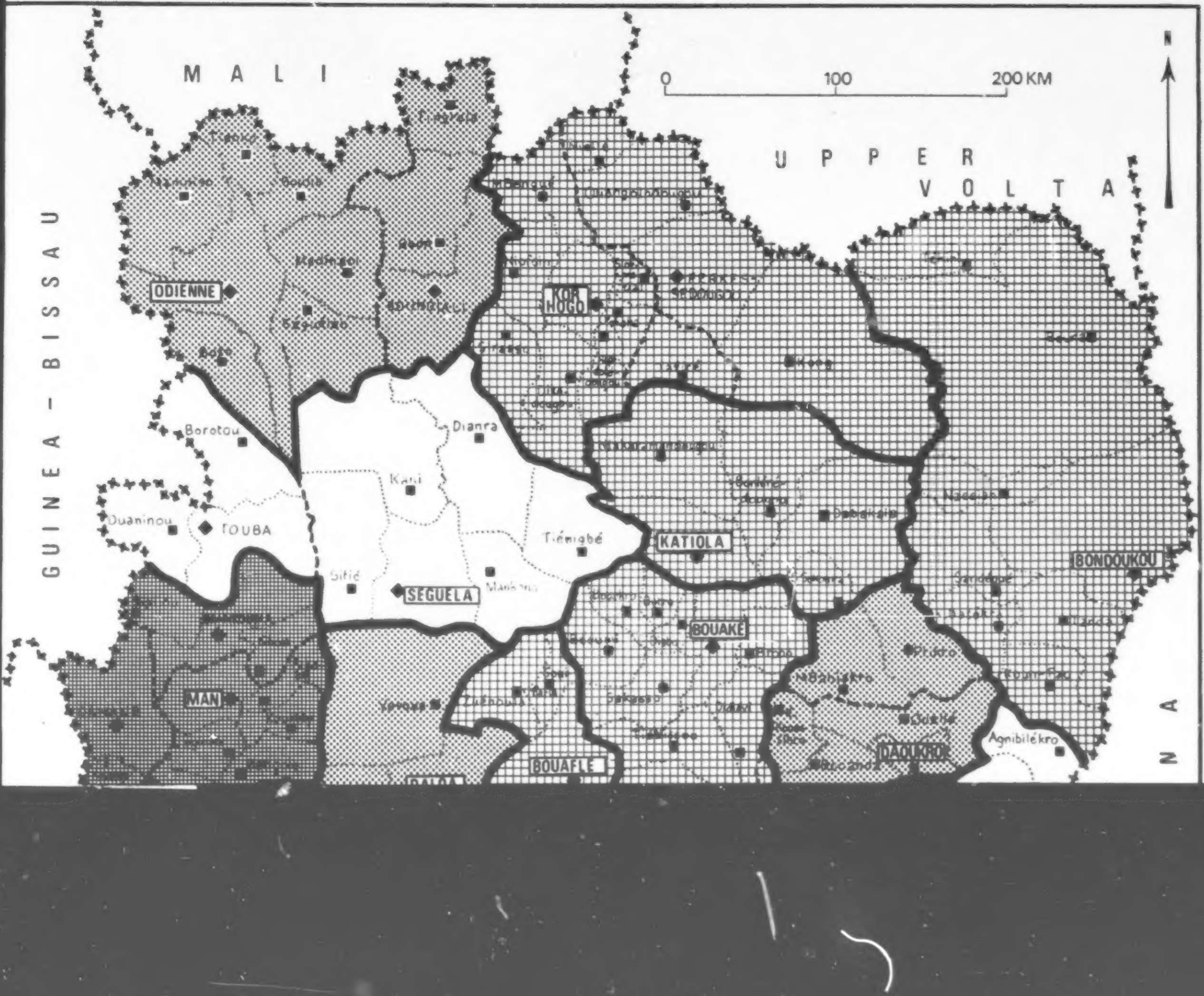
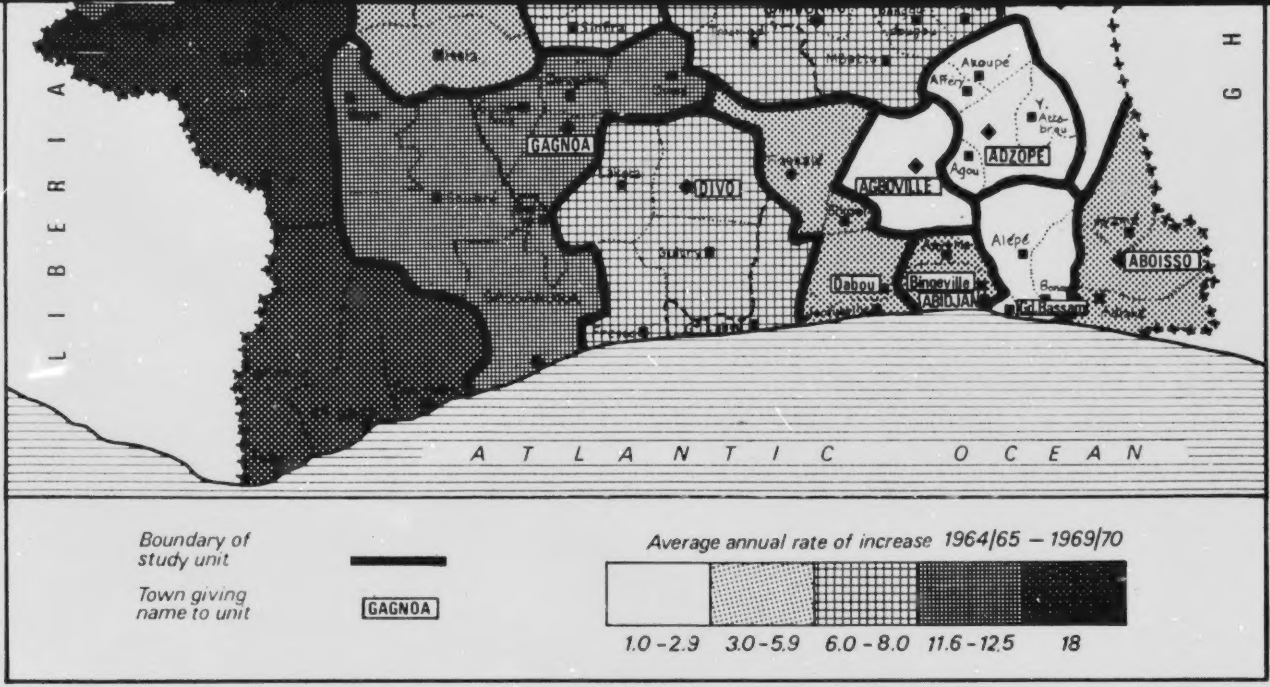
[1] Some preliminary definitions:
(a) Many countries plan their school system in response to the 'social demand' for education which, in actual fact, is the demand from members of the public. It is no easy matter to measure this demand directly. However, two indicators make it possible to get an idea of its size, namely (i) the number of children in a given age-group, which may be considered as the basis for assessing the demand, and (ii) the participation rate, or the ratio between the numbers of children in a given age-group attending school, and the total numbers of children in that age-group; what we have here is 'satisfied demand'. In what follows, we shall be using one or other of these indicators in speaking of the demand for education.
(b) Educational offer has to do with the geographical distribution of the stock of school premises by type and level of education provided. Although vague, this definition is very convenient; when we identify the supply being provided by the schools we implicitly include everything that makes them work: teachers, curricula, equipment, etc. A map of school premises therefore illustrates what the supply structure is at any given moment.


MALI
UPPER VOLTA
GUINEA - BISSAU
0
100
200 KM
N
Tingrela
ODIENNE
KORHOGO
Borotou
Dianra
Kani
Ouaninou
TOUBA
Tiéningbé
Sifié
SEGUELA
Mankono
KATIOLA
BONDOUKOU
BOUAKE
MAN
BOUAFLE
DAOUKRO
Agnibilékro
DALOA


LIBERIA
GH
GAGNOA
DIVO
AGBOVILLE
ADZOPE
ABOISSO
Akoupé
Afféry
Y. Attobrou
Agou
Alépé
Dabou
Bingerville
ABIDJAN
Gd Bassam
Bonoua
ATLANTIC OCEAN
Boundary of study unit
Town giving name to unit
GAGNOA
Average annual rate of increase 1964/65 – 1969/70
1.0 - 2.9
3.0 - 5.9
6.0 - 8.0
11.6 - 12.5
18

Map 16. *Ivory Coast: evolution of enrolment rates in the various regions between 1964/65 and 1969/70.*

TABLE 7. Unevenness in provision of schooling in Chahroud, San Ramón and Sligo

			Participation rate	Pupil/teacher ratio	Rate of use made of premises
Chahroud (Iran)	Minimum		21	28	1.3 sq. m. per pupil
Primary schooling	Maximum		78	36	3.0 sq. m. per pupil
(6–10 years)	Average		63	32	2.0 sq. m. per pupil
San Ramón (Costa Rica)	Minimum	(at 12 years)	43	19.5	0.95 sq. m. per pupil
Primary schooling	Maximum		100	28.4	1.66 sq. m. per pupil
(6–12 years)	Average		78.4	20.5	1.30 sq. m. per pupil
Sligo (Ireland)	Minimum		26	11.8	67 per cent
Secondary schooling	Maximum		83	26.6	100 per cent
(15–18 years)	Average		58	17.4	80–90 per cent

and Table 7 does the same for three countries in different continents.

It will be seen that even inside geographical areas as small as County Sligo in Ireland, the Chahroud area in Iran or the San Ramón area in Costa Rica, with fifty to a hundred thousand inhabitants, there are considerable differences in the educational level measured by participation rate, in pupil/teacher ratios, premises available, and rates of occupation and use made of them. More systematic comparisons carried out in the course of studying promotion, repeater and drop-out rates, teachers' qualifications, furnishings and equipment and adequacy of premises, unit costs and budgets, confirm and strengthen a conclusion reached in the course of research work on Costa Rica. This conclusion deserves to be quoted:

> 'A number of weaknesses are to be seen in the primary-school network in 1972, as follows:
>
> (a) not all pupils enjoy school days of the same length;
> (b) not all pupils have the advantage of the same pupil/teacher ratio;
> (c) not all schools enjoy ancillary premises, nor are they of the same standard;
> (d) while distances between home and school on average are small, there is a possibility of great variation in time taken, depending on the locality under consideration;
> (e) even if, on average, primary schooling is very advanced as a whole, participation rate at the age of six varies from 51 to 93 per cent;
> (f) profitability of the schooling provided, measured by repeats, drop-outs and promotions, shows significant variations from course to course and from catchment area to catchment area;
> (g) furnishings and equipment, in the shape of libraries, sanitary arrangements and specialized classrooms are not equally available either in quantity, or in quality, in all schools. . . .'

In accounting for this state of affairs, which is quite customary everywhere, it is usually said that the repercussions of the amount of schooling provided on environmental conditions and *vice versa* are numerous and complex, and that the diversity of environmental conditions finds its expression in the diversity of the amount of schooling provided. R. Ruiter has made a systematic study of this in the case of the Netherlands and what he says may usefully be referred to here.

The author's starting-point is that the percentage of admissions of 12-year-old children to the first year of grammar school varies from area to area, from 0 to more than 40 per cent. He pinpoints a number of factors which he thinks must, in the nature of things, promote unevenness in school participation rates: the extent to which the area is urbanized, income levels, the amount paid in taxes, socio-professional category, creed and distance from home to school. Table 8 shows that there is a real connection between these factors and the participation rate in schools of general or technical type. In order to estimate the 'weight' of each factor, Ruiter has done a multiple correlation analysis and the result he reaches is particularly striking, namely that the most significant explanatory factor is 'professional class', the other factors, and particularly the extent to which the area is urbanized, contributing very little to the explanation being sought. This means that it is unevenness in the attitude of the various socio-professional

TABLE 8. Characteristics of areas with highest and lowest rates of admission to first year of grammar school in 1957: a survey in the Netherlands

	18 regions with		
	high enrolment rates	low enrolment rates	Netherlands
First-year admissions to grammar schools as a percentage of the 12-year-old population	30	10	20
First-year admissions to secondary modern schools as a percentage of the 12-year-old population	38	30	33
First-year admissions to secondary technical and vocational schools as a percentage of the 12-year-old population	30	42	36
Average income per capita (guilders)	2,060	1,380	1,710
Percentage of tax payers with an income over 6,000 guilders	19	13	16
Percentage of taxpayers with an income over 10,000 guilders	7	4	5
Percentage in labour force of:			
Professional and managerial occupations	19	4	10
Clerical workers	20	8	14
Non-agricultural employers	9	8	8
Non-agricultural workers on own account	10	11	10
Farmers	1	22	9
Agricultural workers	1	9	4
Non-agricultural workers	40	38	45
Percentage of population in towns of:			
>100,000 inhabitants	54	—	30
> 50,000 inhabitants	70	—	40
> 20,000 inhabitants	85	—	50
> 10,000 inhabitants	90	4	56
> 5,000 inhabitants	93	20	64
Religious composition of total population as a percentage:			
Catholic	35	28	38
Calvinist	28	44	31
Dutch Reformed	8	17	10
Others and non-religious	29	11	21
Percentage of army recruits in intelligence classes 1+2 (30 per cent highest intelligence)	41	21	30
Average distance from nearest grammar school in km	2	8	4

categories to education that seems to provide a large part of the explanation for the unevenness in school participation rates from area to area in the Netherlands.[1]

In Morocco, in the Kénitra province, a very remarkable attitude to school attendance is to be found. Several communes in this province have a limited schooling infrastructure and, in particular, certain communes with 30,000 inhabitants have only six or seven primary schools to deal with several thousand children of compulsory schooling age. And yet the schools are less than fully utilized, and participation rates are negligible, not to say nil, even in respect of children living close to the school-location. In other words, even though there is a restricted amount of supply, demand is non-existent. Clearly, one cannot develop school attendance simply by putting up school premises and remedying a teacher-shortage. As we shall see in section 2, other aspects have to be taken into consideration, including that of people's attitude to education in rural areas.

If we are prepared to apply these findings to other countries, it would seem that it is demand for education which influences the development and structure of education supply. The fact of the more 'demanding' socio-professional categories living in urban areas, rather than in rural areas, would explain why educational supply is more highly developed in the big built-up areas than in villages.

But if we are to take this argument to its logical conclusion, we have to infer that the target of levelling-out, geographically and socially, the opportunities for acquiring an education, which is acknowledged to be a desirable thing in most countries, is not one to be kept on the agenda by those in charge of educational policy. There would be no purpose, in fact, in levelling out education supply over the various areas of a country if there were no demand for it.[2]

Actually, the studies we have made show that the relationship between supply and demand is not a one-way street; while it is true that demand influences supply, it may equally well be said that supply determines demand, as is shown by the following examples.

In Ireland, in the second cycle of secondary schooling, courses are divided into five options: languages, science, technical studies, social studies and commercial training. In County Sligo it has been noted that (i) in spite of movements of pupils from one geographical area to another the second-cycle participation rate (at 17 years of age) varies from 8 per cent in areas with few facilities, to 73 per cent in the chief town of the county which has a large range of schools, and (ii) the choice of option depends very largely on the options offered by the existing schools. In particular, there are some areas where no child has signed up for 'science' and 'technical studies' options; if he does, he will have to leave his home locality and cover more or less long distances. The prestige of 'literary' options being what it is, he naturally takes the line of least resistance and goes to school in his own area, even if the school is not offering scientific or technical education. In this case, it may be inferred that the structure of supply has directly influenced demand as measured by participation rates.

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[1] R. Ruiter, 'Education and manpower forecasts', in *Planning and development in the Netherlands*, Assen, 1969, p. 66 (Vol. III).

[2] This seems to be confirmed by an investigation made in the Austrian province of Voralberg; in spite of all the urging of teachers, the children most fitted to continue their long-cycle secondary schooling leave school. Cf. P. Meusburger, K. Grohmann, *Schulplanung und Schülerverlaufsstatistik in Voralberg*, Vienna, Bundesministerium für Unterricht und Kunst, 1973.

The complexity of the relationship between education supply and demand can also be seen in the Ankole district of Uganda. Here, supply is characterized by two variables, namely (i) organizing authority (State, private Catholic, private on the part of the Church of Uganda, etc.) and (ii) the school's prestige and reputation. Demand is not passive and parents endeavour to send their children to schools identified with their creeds and avoid new schools which have not yet proved themselves. The result in the Rubindi district, for instance, is that children have no hesitation in covering large distances to attend high-prestige schools, or schools coinciding with their creeds. The establishment of a school, i.e. the provision of supply, in an area with no schools, will not necessarily be followed by adequate school frequentation. As against this, there is thought to be a large potential demand for certain types of schools not yet available.

One can only analyze the relationship between educational supply and demand meaningfully once the nature of the supply (options, standard and level) and the characteristics of the demand (volume, type, etc.) have been clearly established. Even in countries which have school systems partially or completely standardized, such as Algeria and the USSR, people continue to differentiate between available schools on the strength of subjective criteria, such as the name of the school, its historical background, what it looks like from outside, and so on, or objective criteria such as the ease with which it can be reached, its pedagogic structure,[1] and so on. This is *a fortiori* the case with countries where several education systems are in competition with one another, as, say, in the Lebanon and Cameroon. Overall, solutions to the problem of unevenness in the provision of schooling have to be sought in a very detailed analysis of operating factors before any propositions are put forward for rationalizing the school map.

For instance, supply problems vary greatly, depending on whether the object of concern is schooling in modern towns and cities, the urban areas of industrialized towns, the suburbs of capital cities, large agricultural plantations, or traditionally rural areas. The first three categories are customarily regarded as urban and will be dealt with in section 3 below. Section 2, which follows, will be devoted to questions of schooling in rural areas.

2. Schooling in rural areas

Primary schooling made extremely rapid progress during the sixties, and it seemed possible that the target of universal primary education could be reached quickly in almost all countries in the world, if the decisions of the Unesco regional conferences at Addis Ababa, Bangkok and Santiago ten years ago or so were to be credited. Unfortunately, the rate of educational progress has slowed down and it looks as though in some developing countries universal primary education is not very likely before the end of the 20th century, or even before the 21st. The reasons are many and well known. The galloping increase in population calls for an ever-increasing effort just to keep the amount of education provided at the level it has already reached; unit costs are going up and necessitating more and more funds in spite of the fact that the share of national income voted for education already stands at a record figure; the explosion in social demand for secondary and higher education reduces the amount of funds available for the primary sector; there are also difficulties in bringing education to rural areas with low population density once schooling has been provided in more heavily-populated, and more highly-developed areas. With the school map available, this problem can be studied, the causes analysed and a number of solutions proposed.

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[1] Secondary schools with a complete pedagogic structure, including the second cycle, acting as *central* establishments, and giving privileged treatment to their first-cycle pupils, depend on those who attend schools with an incomplete structure, i.e. without any second cycle; the latter institutions are thereby reduced to the status of annexes. This helps to explain the considerable favour which the first cycles of *lycées* in France continue to enjoy to the detriment of *collèges d'enseignement secondaire*.

(*a*) *The environmental conditions*

As statisticians are aware, the notion of a rural environment is a question of definition. There are some countries such as Bangladesh where places with less than 2,000 people are rural, provided they are some distance away from large towns, while in other countries with low population density rural communes have 500 inhabitants at the most. Since it seems to be impossible to find a universally acceptable definition, we shall adopt one arbitrarily—one not applicable to any country in particular and involving a very restrictive notion of what a rural area constitutes, but one that has the merit of sharpening the context it refers to.

The rural environment is characterized by a population of which in many cases little is known, or a population difficult to get to know. There are villages officially listed which will soon disappear, and others which exist, although unknown. This is what was found when the Souk El Arbâa circle in Morocco was being studied; similar conditions characterise the Chahroud area in Iran.

Population movements on a large scale bring about a net deficit and it is often impossible to predict and to define them with any exactitude. In the San Ramón area of Costa Rica population data were so little 'acceptable' that they had to be corrected with an across-the-board calculation to make them 'admissible', i.e. plausible.

The nomadic way of life makes the obtaining of demographic data a matter of chance. With the Saoura region in Algeria or the Toroud *dehestan* in Iran, there is no possibility of making any precise estimate of the nomad population to which education needs to be brought.

People are scattered in hamlets, *douars* or *barrios*. Such places are often cut off from any practicable road and lie some hours' distance on foot or horseback or by canoe from the first possible means of communication. The Kaski district in Nepal is developed but one still has to do a lot of walking or use a horse as soon as one leaves Pokhara the capital behind to go and look at the schools in the 'plain', and in the Shott el Arab area in Iraq the great majority of villages cannot be reached without the help of a boat.

Whether there are ten, twenty or a hundred dwelling-houses, the total numbers in each population unit seldom go beyond 400 to 500. In the Khémichet commune in Morocco there are 26 *douars* with less than 200 inhabitants, and in the Regar district of Tadjikistan in the USSR 32 communes, out of a total of 140, have less than 200 inhabitants. The Los Angeles district in Costa Rica has more *fincas* or isolated one-family farms than real villages.

Telephone system, electric supply, post office, clinic or dispensary are rarely met with, not to say non-existent. It often happens that the villages live completely without any contact with the outside world for months at a time, and even during the good-weather season, any communications with the town or neighbouring villages are 'centralized', one person undertaking to do errands or commissions for the others.

There is little doubt that such a state of affairs offers a real challenge to the school map.

(*b*) *Supply and the problems connected with it*

The size of 'population units' is too small to justify the setting-up of economically viable schools. Since primary schooling is for the 6 to 10 age-group, i.e. for five years, and since this age-group accounts for 10 per cent of the total population, any village with less than 150 inhabitants will provide an enrolment of less than 15. This means that the primary schools in these villages will be 'multi-grade', with one teacher and a low pupil/teacher ratio, and very high unit costs.

Secondly, the lack of adequate means of communication utilizable throughout the year makes the transport of school children from one village to another difficult, or even impossible, to organize, and consequently it is not always possible to contemplate setting up more economical school units able to look after the needs of a number of villages. Distribution of documents and teaching materials is not easy to arrange and schools, if they exist, often do not even have school books to give to their pupils. There are problems also with the payment of teachers' salaries; it frequently happens that the teacher has to go to the chief town in the area to receive his salary. Visits from school inspectors or advisors are rare occurrences; in some cases they take place only every two or three years, and are of no assistance in maintaining either teaching standards or continuity of service given. Lastly, ill-maintained premises sometimes present the deplorable sight of a ceiling holed by bad weather and never repaired, broken panes not replaced, no sanitary arrangements or very rudimentary equipment.

In these circumstances, there is no need to be surprised either at the attitude of the teachers, or at the attitude of parents towards education in rural conditions.

(*c*) *The attitudes of teachers and pupils*

There is tendency to overlook two factors in planning universal primary education, namely the attitude of the teachers and the attitude of the children.

The impression one gets is that all that has to be done to ensure that teachers are on the spot in the most isolated villages is to estimate teacher requirements, provide funds for salaries and go into the question of recruitment. Unfortunately, experience amply demonstrates that this is not the case, and that the real problem is, and remains, that of encouraging qualified teachers to teach in rural areas. Whatever their socio-professional class, teachers are usually from towns or large villages; after living in the regional capital, where the teacher-training college is normally to be found, they will be the more reluctant to accept an appointment in a country village because of the other more attractive prospects available. Add to this that the training they receive does not necessarily encourage them to opt for the simple peasant life and that their career prospects are often improved by teaching experience in large towns, and it will be no surprise to see the difficulties met with by regional educational authorities in finding teachers for their rural areas. Some countries have brought in a system of bonuses for remoteness or for teachers living away from their normal surroundings, to encourage them to accept appointments in isolated villages. So far as we know, apart from a very few exceptions which are probably specific cases, remoteness bonuses have not done anything significant to assist the recruitment of teachers for rural areas.

The impression also exists that all you have to do is to open a school and a sufficient number of children will come and enrol and attend regularly. IIEP rural school-map research shows that this is not so; a theoretical number of school children is recorded for the opening of the school, and afterwards it is frequently attended only by a very small number of them. It cannot be said that there is a demand for education in all the areas that have been investigated. Without wishing to generalize, we may hazard the following remarks on the basis of a sample consisting of ten or so case studies:

(a) In most rural areas with direct or indirect contact with developed areas, the demand for schooling is all the stronger for being stimulated by tendentious or wrong information about the actual advantages to be gained from attending school. As an illustration, the well-known examples may be cited of the '*Harrambee* schools' in Kenya, the 'clandestine schools' in the Ivory Coast, the 'village schools' in Afghanistan, the '*barrios* schools' in the Philippines and some '*municipe* schools' in the north-east of Brazil.

(b) In certain isolated rural areas where a subsistence or non-cash economy is in force, there is simply no demand for schooling. Lack of information and inhibitions of all kinds work to combat educational progress.

(c) Thirdly, there are some areas which seem to be refractory to education even though a school network has been set up and there is a policy of encouraging school attendance. One has only to think of what happens in certain Moroccan *douars* or Iranian *bakshes*, where parents prefer to have their children's help in the fields rather than send them to school and/or refuse to let their daughters have schooling for religious or social reasons.

More generally, the rural school map comes up against a number of problems which derive from the very nature of the environment, namely the material difficulties of organizing supply, and parents' resistance to education. Solutions can only be found empirically in each country as the context or its possibilities indicate. Here we shall not go further than to give a few indications.

(*d*) *Some possible solutions*

(1) Demand for education can develop only if changes take place in the rural environment; parents have to be convinced of the advantages of education if their attitude to schooling for their children is to be changed. In certain cases a combination of rural and community development is needed, together with information on education as a factor for social and economic advance, and the provision of canteens and school transport to encourage school attendance. Only in this way is there any possibility that the obstacles facing the provision of schooling[1] can be

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1. In a recent report on Thailand's experiences with an education project directed to meeting the requirements of local communities, Bennett and Vorapipitana write as follows:

'At first sight, it might have appeared that a country like Thailand would be one of the last to bring village people and provincial educationalists into the business of designing, working up, organizing and putting into effect education programmes directed to meeting the requirements of local communities. . . .

As we see it, the relative success that has been achieved finds its explanation in the following four basic reasons:

overcome. Getting girls to school calls for recruitment of women teachers on a large scale; this has been brought out particularly in the study done on Iran which, in its section on the establishment of a school map for the Chahroud area, proposes the setting-up of training centres for women teachers.

(2) The reluctance of teachers to work in rural areas may be combatted in two different ways. In countries with a system of compulsory military service, a system of 'civic service' for teaching may be introduced, with those who successfully complete a secondary or higher course of education working for one or two school years in rural areas after a period of training. Apart from the possible short-term advantages, this civic service could awaken vocations and lead, as is the case in Iran, to the recruitment of some thousands of ordinary country teachers. In other countries, the drawing-up of the school map could be combined with the planning of teacher-training; each area would work to even out on a geographical basis the admission of young people to the training college so as to take care of requirements; the best way of being sure of appointing a teacher to a certain place is to admit to the training college a pupil-teacher from the place itself or a neighbouring place, and this is what is being envisaged by those in charge of educational planning in the regions in Algeria. A system of contractual agreements with future teachers could also be set up when they are admitted to training colleges.

(3) Since it is materially impossible to organize collective and social services in small villages, some countries have been led to adopt the principle of 'population amalgamation'. In Latin America Bolivia, Colombia and Peru have started on this road. The study carried out on the Tadjikistan Republic in the USSR takes population amalgamation as something already decided on (see Table 9) and is drawing up the school map on this basis. Again, the study on the Chahroud area in Iran takes the disappearance of villages with a population of less than 50 and the setting-up of a road infrastructure as prior conditions for bringing in a school map enabling the targets of the VIth Plan to be achieved. Generalizing the findings

TABLE 9. Where people live and are to live in the Regar district of the Tadjikistan SSR

	1961	1971	1981
Communes with 100 to 200 inhabitants	44	32	5
Communes with 201 to 500 inhabitants	53	50	16
Communes with 501 to 1,000 inhabitants	37	40	19
Communes with more than 1,000 inhabitants	6	18	23
Total	140	140	63

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(1) the degree of commitment shown by central government civil servants in charge of rural development;

(2) the way in which these officials respected the villagers' scales of values, avoiding any attempt to transform them into second-class carbon copies of Western man;

(3) the reduced initial scale decided on for the operations and the fact that they were pushed forward in accordance with the capacities and motivations of the managing staff;

(4) the systematic nature of the methods followed, each new step arising logically from the one before it.'

Source: N. Bennett and K. Vorapipitana, *Towards community-centred education for national harmony and development in Thailand*, Paris, IIEP Seminar Paper No. 14, 1975.

arrived at, it may be inferred that in certain countries the only possibility for universal primary education lies in a policy of population amalgamation.[1]

(4) On the strength of the regional education-satellite projects launched in Brazil and other Latin American countries and in French-speaking Africa and India, it might be assumed that the resources of advanced technology will enable new solutions to be found for problems connected with schooling in rural areas.

As an immediate prospect, however, the use of education satellites gives rise to difficulties of a political nature (the control of the message content), of an institutional character (statutes and membership of the multi-national body) and raises problems connected with infrastructure on the ground (at the 'receiving' end), all of which can make this solution unattractive for some countries.

Only one example is available of the use of educational television for the generalization of primary schooling, that of the Ivory Coast. What is being done is still at the project stage, and it is difficult to reach any conclusions; one can see, however, from the school-map study on the sub-prefectures of Dabakala and Sikensi that a system of television, far from simplifying the problems connected with the organizing of supply, leads to additional specific limitations at the receiving end, apart from which there seems to be little sense in expecting television to solve all the difficulties of bringing in a school map in rural areas.

The only financially attractive system seems to be that of educational radio, which is not very expensive and does not call for any particular infrastructures at the receiving end. Its effectiveness, however, depends on the country's level of development and on whether the people concerned are literate; even the 'school of the air'[2] will work in an isolated farmstead in Australia or Canada because of the help and encouragement which parents and family can give, but it is hardly realistic to count on great results from educational radio in an isolated village in the Hindu Kush or in a *gomborora* in the Uganda bush country.

(5) This being so, those organizing schooling in country districts will have recourse to a school map of a more complex character; supply will be organized in ordinary schools or literacy campaign and rural education centres. Schools or centres will be part of a network to include central schools, satellite or amalgamation schools, small one-teacher schools and schools in isolated areas. Some countries, such as the Ivory Coast for instance, are prepared to see the school 'move' from village to village, with the children being put up in turn by successive groups of parents. Other countries with a nomad population recognize the need to institute nomad schools that fit into the environment and feature teachers who are themselves of nomadic origin.

Apart from these exceptional cases, which are justified because of special local circumstances, the foundation for schooling in country districts is, and remains, the small one- or two-teacher school.

(*e*) *One-teacher schools*

(1) As an illustration of the importance which one-teacher schools can have, relevant statistics from a number of countries are set forth in Table 10.

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[1] This does not mean that population amalgamation is always desirable however it is effected, and whatever are its political aims, acknowledged or implicit.

[2] See 'Australia's correspondence schools, with supporting broadcasts, and radio university', in *New educational media in action: case studies for planners—I*, Paris, Unesco/IIEP, 1967.

TABLE 10. One-teacher schools in 1961.

	Teachers			Pupils		
	Primary Education	One-Teacher Schools	%	Primary Education	One-Teacher Schools	%
Afghanistan	2,818	606	21.8	123,117	26,761	21.7
Albania	5,110	1,194	23	174,332	37,400	21
Australia	36,724	3,262	8.9	1,203,949	71,938	6
Austria	16,401	957	5.8	511,710	24,905	4.9
Belgium[1]	38,410	2,279	5.9	955,650	50,214	5.3
Brazil[1]	207,870	80,856	38.9	1,376,245	518,492	37.7
Bulgaria	22,011	1,132	5.1	1,000.000	26,000	2.6
Byelorussia	31,399	1,553	4.9	702,517	—	—
Chile	21,468	1,141	5.3	726,753	52,676	7.2
Colombia	38,061	13,303	30	1,493,123	—	—
Denmark	14,146	673	4.8	357,334	21,536	6
Ecuador	12,611	2,941	23.3	529,224	—	—
Ethiopia	3,100	129	4.2	141,777	9,144	6.5
Finland	22,769	753	3	624,195	—	—
France	218,488	43,490	19.9	5,840,000	1,017,400	17.4
German Federal Republic	130,037	8,411	6.5	4,868,786	280,741	5.8
Honduras	6,109	2,196	35.9	190,261	—	—
Hungary	56,449	171	0.3	1,314,432	3,428	0.3
India	710,139	116,263	16.4	25,964,808	4,221,501	16.3
Iran	27,716	3,527	13	978,810	133,161	13
Ireland	14,233	755	5.3	505,363	—	—
Italy	184,724	11,517	6.2	4,704,158	210,516	4.5
Japan[1]	372,556	566	0.2	13,423,482	5,674	0.1
Jordan	4,073	261	6.4	148,598	8,573	5.8
Luxembourg	1,098	250	22.8	28,014	—	—
Malaya	37,596	496	1.3	1,072,552	15,026	1.4
Netherlands	42,104	76	0.2	1,475,492	1,200	0.1
New Zealand[1]	13,150	502	3.8	418,888	—	—
Nicaragua	3,770	1,487	39	152,783	62,887	41
Norway	15,081	458	3	439,000	4,144	0.9
Panama	4,833	479	9	110,330	—	—
Poland	140,311	4,531	3.2	4,574,225	128,408	2.8
Spain	93,924	44,062	47	3,598,191	—	—
Sweden	36,218	173	0.5	837,029	2,406	0.3
Switzerland[3]	6,803	659	9.7	221,697	14,575	6.6
Thailand	95,981	893	0.9	3,434,207	41,766	1.2
Tunisia	6,155	3	0.1	361,532	56	0.1
Turkey	51,148	12,945	25	—	—	—
Union of South Africa	14,768	408	2.8	440,656	4,100	1
U.S.S.R.	152,400	22,300	14.6	2,949,500	442,000	14.9
United Arab Republic	73,394	1,125	1.5	2,710,067	39,874	1.5
United Kingdom[2]	157,001	1,765	1.1	4,767,888	31,970	0.7
England and Wales	132,424	970	0.7	3,969,319	17,329	0.4
Scotland	18,300	650	3.6	603,530	11,700	1.9
Northern Ireland	6,277	145	2.3	195,066	2,941	1.5
United States	814,967	23,696	2.9	23,414,947	400,000	1.7
Uruguay	7,783	739	9.5	251,690	—	—
Vietnam	17,819	1,169	6.6	1,001,757	76,579	7.6

1. Public and private schools.
2. Total of the figures given for England and Wales, Scotland and Northern Ireland.
3. Total of the figures given for the Cantons of Bern, Fribourg, Grisons, St. Gallen, Ticino and Vaud.

Source: IBE, *The one-teacher school*, Geneva, 1961

Since 1961, there have of course been changes. In certain countries, particularly in Europe and North America, accelerated urbanization, and the reduction in numbers of small places, has meant that the number of one-teacher schools has probably gone down also. On the other hand, there are other countries where educational expansion was possible only through an increase in the number of such schools.

(2) No unanimity exists concerning the advantages and disadvantages of one-teacher schools. Some regard them as full of disadvantages, both from the point of view of teaching, and from the point of view of economics. Let us look at these disadvantages:

(i) From the cultural standpoint, the future of an entire village depends on one person, the teacher. If he is not very well qualified, a whole generation of children will suffer. If he is unwell, there is no school. If he is not up to simultaneously organizing the work of children in several classes (the multi-grade system), there is a good chance that some classes will be involuntarily sacrificed, and since, on the whole, the best teachers are not attracted to isolated rural areas, since teaching materials are not always available, and since visits from inspectors and education advisors are few and far between, schooling provided by one-teacher schools tends to be of a very poor standard.

(ii) Even where a country favours development of one-teacher schools and tries to even out teaching standards by bringing them up to the level of those in ordinary schools, different factors tend to increase capital cost. For instance, space must be found on the school premises for storing and using a wide variety of school furnishings and equipment covering the requirements of children from six to ten who are being taught together—a child of six is 15 to 20 per cent physically less developed than a child of ten or eleven, and cannot use the same desk. In the same way, the teacher must have somewhere to live. Also, it may prove necessary to offset the feeling of loneliness affecting teachers appointed to isolated villages; those responsible may have to construct common accommodation for individual teachers looking after one-teacher schools, each of whom may go from home to school on foot, on horseback, on a bicycle, or in a boat.

Others consider that the advantages of one-teacher schools outweigh the disadvantages, arguing that:

—with one-teacher schools children remain in their natural environment and are not 'uprooted';

—teaching a number of children at various levels of attainment may result in the more advanced of them acting as a stimulus for those who are weaker; also the teacher can use more advanced pupils as helpers;

—substantial economies can be effected in the costs of transport and boarding schools;

—in any case, it is neither desirable nor possible to separate the youngest children from their parents, and the one-teacher school is the only solution for children in the earliest years of primary school.

(3) As an illustration of the difficulty of reaching conclusions in this connection, we might recall the findings of the research carried out in County Sligo in Ireland.

As the result of a study of the Irish school system made some years ago the Irish government decided to gradually close down all one-teacher schools and establish a school-transport system. When the primary school map for County

Sligo was being investigated, two alternatives were examined, i.e. either to maintain one-teacher schools or to do away with them. Keeping on one-teacher schools means a saving of current expenditure amounting to £21,000[1] in 1976, and total capital expenditure amounting to £40,000 to £50,000. Closing down one-teacher schools means savings in current costs amounting to £1,700 and capital expenditure amounting to £92,500. Thus, the solution entailing keeping them on seems to be the better one from the point of view of economics, and it raises less political problems since it reduces the number of schools to be closed down and is probably the better solution for young children in nursery classes. None the less, it is not easy to compare the two alternatives from the teaching point of view.

The example of County Sligo shows how dangerous it is to draw general conclusions either for, or against, one-teacher schooling. Similarly, after having for a considerable time a policy of systematic re-grouping of the first cycle of secondary education with the primary classes, France announced for the 1976/77 school year a 'swing' in favour of small rural establishments (see the *Bulletin Officiel* of 27 November and 4 December 1975). Each country must decide which is the solution that appears most appropriate for the actual state of affairs prevailing. However, in view of the research findings concerning the rural school map it looks as though some countries will have to continue for a long time with one-teacher schools as part of their school networks. A school map aimed at linking one-teacher schools to central schools, making sure that school furnishings and materials are distributed, guaranteeing schools-inspection and advisory services, and limiting operations to say a three-year first cycle of primary school, would make it possible to palliate certain disadvantages of these schools without detracting from their very real advantages.

3. Schools in urban areas

The notion of an urban area, like that of a rural area, is difficult to define. What kind of housing structure, how many inhabitants, what sort of economic activity, what density of population, etc. justify one's applying the adjective 'urban' to a given area? Town-and-country-planning experts have found a number of answers to the question by pinpointing centres called first class, second class, third class, fourth and fifth class, and so on. The characteristics of each category of centre depend on the country under consideration and on the conventions adopted. For instance, the installation regulations drawn up by the Moroccan Directorate of Town Planning and Housing make a distinction between:

> '(1) Primary level (or first-class centre): 3,000 people living on 2,500 hectares. Here are to be found all the facilities necessary for daily life, *hamam*, communal centre for baking, the mosque, shops for every-day needs, meeting halls. . . ;
> (2) Secondary level (or second-class centre): 7,500 people (1,500 families) on 7,500 hectares, with school, permanent shops for occasional purchases, a meeting hall, a women's club, in some cases the main place of the commune, plus all that is available at the primary level;
> (3) Tertiary level (or third-class centre): 30,000 (6,000 families) on 30,000 hectares; here, in what is usually the main place of the commune, one finds a

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[1] £0.411 = 1U.S.$.

> secondary school, a bank and a farmers' loan institution, a health centre and high-class stores. The tertiary centre has to be a small town with a sort of market of area importance and, of necessity, there is a road affording connection to the nearest town.'[1]

As regards the school map, problems specific to the urban area actually arise only from the third-class centre upwards for primary schools and from the fourth and fifth classes upwards for secondary schools. In other words, only towns above a certain size, with a population of between 30,000 and 50,000 in the case of primary schools, and with more than 100,000 inhabitants approximately in the case of secondary schooling, are dealt with in this section.

Moreover, it is important to note that apart from the 'size' factor, expressed in terms of numbers of inhabitants and physical relief, the 'standing' of the town and its past and present 'dynamism' are elements that must be taken into account when problems of schooling in towns and cities come under study. For instance, a distinction should be made between:

(a) national and regional capitals and other towns;
(b) the administrative centre and economic and political capitals;
(c) an ancient place in decline, an ancient place that is developing and a new town;
(d) old and new town-quarters and shanty towns;
(e) residential quarters, commercial quarters, etc.

For the sake of completeness, a study should have been made of a cross-section of cases representative of the various situations and problems to which the urban school map gives rise. Unfortunately, shortage of time and resources has made it impossible to do more in the framework of IIEP research than carry out a study of two quarters in Casablanca in Morocco, an outline project of the city of Phnom Penh in the Khmer Republic, a quick investigation of the school map for the new city of Islamabad, the capital of Pakistan, and some analyses of work done[2] on the cities of Addis Ababa in Ethiopia,[3] Ibadan in Nigeria[4] and Pittsburgh in the USA.[5] In this section, therefore, we have had to limit ourselves to analysing only those aspects for which information was available, namely (a) the impediments in the shape of land and population, and (b) the aims of the urban school map.

(*a*) *Difficulties in connection with the urban map*

If one consults the manuals on town planning, one gets the impression that a site for the school is customarily selected in such a way that it will satisfy a number of purposes and considerations connected with the catchment area to be covered, such as accessibility, volume of motor-traffic, physical relief, the cost of putting in gas, water, electricity, etc. In actual fact, such a process is very rare because the bank of available land is 'inelastic' and the potential number of those to be schooled is by contrast very 'elastic'.

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[1] Source: R. Boudet and A. Badou, op. cit.
[2] Independently of IIEP.
[3] W. T. S. Gould, *Problems of secondary school provision in African cities: the example of Addis Ababa, Ethiopia* (mimeo).
[4] *Location and physical condition of schools: an analytical study in Ibadan Metropolitan Area*, study made by the Technical College, Ibadan, Department of Town Planning, Students of second-year class, under the technical guidance of Prof. L. R. Vagale, UN Advisor (mimeo).
[5] Gordon A. Marker, 'Some aspects of educational park planning', in *Socio-economic planning sciences*, Vol. 2, pp. 155–166, London, Pergamon Press, 1969.

(i) *Land.* Usually, land marked down for the erection of schools in towns and cities is chosen because it happens to be all that is available.

Land is sometimes offered to the town council by a donor and even if its situation is wrong, it is used to build a school. For instance, a school was built at Kolfe in Addis Ababa in a sparsely inhabited part of the town and on an unsuitable piece of land, despite the existence of a school in the same part of the city, simply and solely because the land had been donated. Because of the prohibitive cost of land in the Ethiopian capital, which increases in proportion as one moves into areas of high population density, it was decided to build at Kolfe. As a result, the balance of education supply and demand in various city precincts was upset and the children had to bear quite heavy transport costs.[1]

Often, those in charge of the urban school map have to show a lot of diplomacy and negotiating ability in order to acquire sites already occupied by other departments or public or private bodies.[2]

Such sites are seldom ideal, but even acquiring them to put a school on is a challenge in itself. For example, at Casablanca in the Derb Baladia quarter in 1962, the municipal coal market had to be removed to another part of town so that a small piece of land, measuring about 1,500 sq. metres, could be acquired and a school with 21 classrooms built. In 1971, the city council had to make over a piece of land measuring 1,250 sq. metres that was being used as a public square in order to meet schooling requirements. In the case of another piece of land belonging to the Ministry of National Defence, initially intended for the building of barracks, several years of negotiation were necessary before six classrooms could be built. At the same time, in the Derb Mitr quarter, it took an intervention by the Deputy Governor to arrange for the purchase of a piece of land allotted for the building of a mosque so that a school with ten classrooms could be built on it.

The examples quoted show quite clearly that the real questions facing those in charge of the map in urban areas are the following:

(a) with land costing what it does, what is the limit beyond which one must be ready to build *not where one should but where one can*, at the risk of children having to face quite high transport costs.

The case of Phnom Penh is relevant in this connection (even though our information may be out of date since the change of government). An attempt was made to rationalize the catchment areas of the *lycées*, with the primary-school children of one sector being influenced towards the *lycée* in the same sector. However, the present State *lycée* network does not allow this solution to be complied with. As shown in Map 17 (overleaf), most of the State schools are concentrated in the south-east of the city. There are very few *lycées* on the outskirts, and these are inadequate for the education requirements of the part of the city in which they are situated. A flow of pupils takes place from the outskirts

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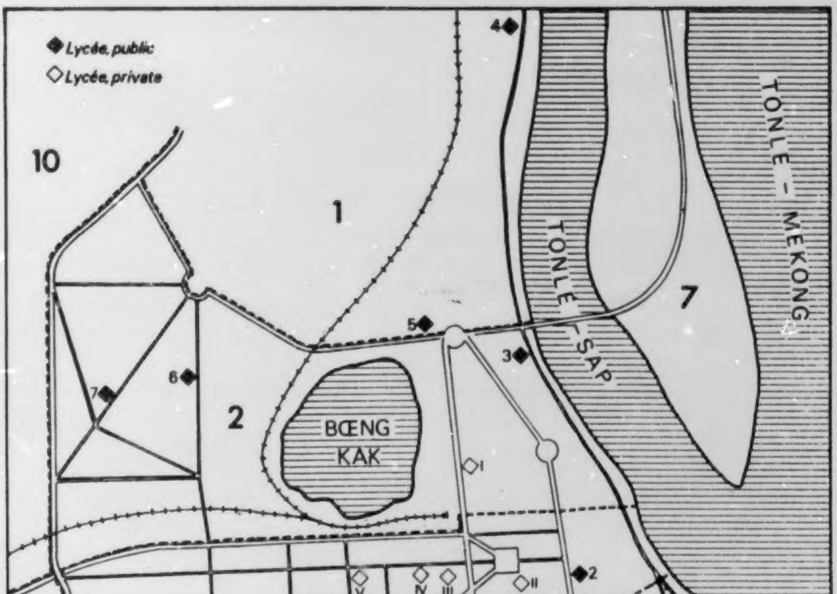
1. In Ethiopia the cost of transport falls on the family.
2. 'Even if a piece of land which is free and adequate can be found, as is not always the case, the owner will endeavour to get the maximum advantage from the sale of it. Discussions are long and tough, often requiring meetings of successive committees; they can be still more difficult if the land in question is partly covered by buildings that need to be cleared. It can happen that available land is under State ownership and reserved for arranging park facilities or putting up public buildings. It is then a question of convincing the city administration, which is not always an easy matter.' Source: G. Porte, op. cit.


◆ Lycée, public
◇ Lycée, private
10
1
2
3
4
5
6
7
11
BŒNG KAK
BŒNG THMAT
BŒNG TRABEK
TONLE SAP
TONLE MEKONG
TONLE BASSAC
1
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MAP 17. *Distribution of secondary schools in Phnom Pehn.*

(city quarters 3 and 5) towards the *lycées* in the city centre (city quarters 4 and 6), and involves quite a lot of travelling for the children concerned.

(b) granted that one can acquire a given site, what sort of a building should be put up to derive the best advantage from it? Theoretically, a large number of school places can be created on any site by building on several floors. In a city like Singapore, for instance, there was no hesitation in building a school with 10 floors on a very small piece of land.[1]

(c) in the old quarters of towns and cities where there are no longer any available sites, those in charge of the school map are faced with two alternatives; either to move residents out, which gives rise to a social problem (namely that of rehousing) or a financial one (that of compensation), or else to bring in a shift-system and build on several floors. The IIEP study of the new North Medina quarter at Casablanca shows that it is possible to meet the demand for primary schooling in this quarter until 1980 simply by adding four new floors to schools already in existence. This solution seems to be the best one in terms of costs, and politically the least difficult to execute, but is it the optimum solution from the point of view of teaching?[2]

(ii) *The school-age population.* As is the case in country districts, little is usually known about the school-map population in urban areas, though different reasons apply—namely 'mobility' and 'ageing'.

The 'mobility' of the school-age population is a phenomenon of considerable complexity. It can take several forms:

—A movement of adult population from town and city centres to residential suburbs to make way for offices, racial minorities or socio-professional categories with a low income level. This is what is happening in a number of towns and cities in North America and Europe.

—A movement of adult population to certain 'historic' quarters restored for the benefit of more or less 'well-off' social categories.

—A movement of adult population from the outskirts to the centre; this is what is taking place in a number of towns and cities of the Third World where, after a stage in the shanty towns, the immigrants coming in from the countryside settle down in town and city centres.

—Movements affecting the school-age population alone, either from one quarter to another, or from outside the city to the city centre. These movements are the result of the attraction exercised by the built-up areas 'where you have a better chance of getting a place at school'.

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1. Among the problems to which this type of school construction gives rise, the problem of a playing yard and adequate space for pupils to get from one section to another deserves mention; building costs per sq. metre are US$36.80, while the purchase cost of a sq. metre of land is US$184.40. It is therefore preferable, other things being equal, to build playing yards 'somewhere up in the air'. Source: Asian Regional Institute for School Building Research, *School building design, Asia*, Colombo, 1972.
2. The other two solutions considered, namely, moving residents out, and building in the western part of the quarter, give rise to other problems, including higher costs, school transport, and the selection of the pupils to be sent to schools further off. We think that final decisions should be taken not by those in charge of the school map, but by the people concerned on the spot, or by their representative. The school-map experts should normally prepare the dossiers and submit them to the representative authorities as required by standing procedures.

It is difficult to give precise world-wide figures relative to the 'mobility' of the urban school-age population, but some indications are available for two cities in Africa, Ibadan and Addis Ababa.

An analysis of 1970 enrolments in Ibadan primary schools in terms of where pupils come from shows that out of 87,791 pupils, 29,932 (34.1 per cent only) come originally from Ibadan and environs, and 4,981 (5.7 per cent) from the Ibadan district; the other 60.2 per cent come either from other districts, from other parts of the Nigerian Federation, or even from abroad.[1]

In Addis Ababa, it is believed that three quarters of the adult population has moved between 1961 and 1967, and nearly 10,000 children, whose parents do not live in the city, are attending primary and secondary schools in the capital.

Without attempting to apply these data to all of the countries in question, we may note that the extent of population mobility is probably considerable, and greatly complicates any school-map planning in certain urban areas.

Another significant factor—the phenomenon of 'ageing' of certain parts of large cities—is one with which public servants in ministries of national education in charge of preparatory work for the beginnings of school years are very familiar. What exactly is meant by this term? When a new quarter of a town or city is built, it can be granted that a relationship exists between the sort of dwelling accommodation put up and the quarter's demographic pyramid; this makes it possible to provide an adequate number of school places for the children who are to come and live in the quarter. After a number of years, it is unusual for the demographic pyramid to have kept the same shape, and it is usually the case that the places provided in the schools are not fully made use of. The result is that in some quarters of large cities premises are under-occupied, while in others it is practically impossible to find a school place.[2]

All in all, 'mobility' and 'ageing' combine to produce wide diversities in population developments in the various quarters of large cities and almost inevitably lead to completely unstable population pyramids, against which we have to set the inertia of existing schools or those in the process of being developed. Whatever formula is adopted, when a school has been built to certain specifications of size, level and type it is there to last for a certain number of years; if schooling requirements do not cover the same period, or do not correspond to what is actually taking place owing to the high degree of instability in the way demand develops, an imbalance arises in the shape of a surplus or a shortage of school places. When there is a surplus the system is 'operating' below capacity, and this finds its expression in increased unit costs. If there is a shortage, scarcity and cost of land in the urban area will usually result in preference being given to steps to increase the number of school places in existing schools, rather than building new schools, so that after a few years of 'ageing' a 'surplus' will replace the 'shortage'.

The lesson to be learnt from the preceding remarks is that everything must be done to avoid freezing the school map in large cities; it must prove possible to convert schools, changing their type, level and size, and they must be built to last

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1. Source: W. T. S. Gould, op. cit.
2. This was confirmed for us in respect of the city of Algiers by the Deputy Director for the Algiers area. It explains the policy adopted in France for planning of the school map in the ZUPs (priority urban building areas).

as short a time as possible.[1] In actual fact, what is found, on the contrary, is that the finest schools and those which have been built to last longest are those located in the cities and large towns.

In dealing with the variation from one quarter to another in the rates of population growth, recourse is simply had to the system of school transport. Apart from the financial aspect, i.e. the cost of transporting children back and forth, this is not necessarily a disadvantage; everything depends on the aims attributed to the urban school map.

(*b*) *The aims of the urban school map*

A priori the aims of the school map peculiar to urban areas are simple, namely, to provide a satisfactory balance between education supply and demand in each quarter of the town or city. Experience shows that there are four factors which complicate definition of the aims of a rational school network in large built-up areas.

(1) Firstly, the existence of a large-scale private sector in urban areas which is not subject to the same regulations as the State sector, particularly in respect of catchment areas and possibilities of increasing the number of school places. Because of the frequently very high level of fees in private schools the differentiation in catchment areas is social rather than geographical, and this makes it difficult to get an idea of the net demand for State schooling, and of what is happening to supply in the private sector. The study made of Casablanca shows in this regard that:

—there are 13 private schools against 8 State schools in New Medina;

—27 per cent of pupils attending the private schools in the New Medina quarter do not live in the quarter;

—out of 97 available classrooms in the private schools, 14 are unused, while State schools are working at full capacity.

The consequence is that the school-map problem will appear in a different light according to the policy followed in respect of the private sector.

(2) Secondly, most of the large towns and cities have a number of prestige schools usually located in old town quarters with a very high population density. Here, even if it can be found, land is always very dear. These schools have a radius of attraction which goes very far beyond the boundaries of the quarter they are supposed to be serving.[2] They enjoy a large enrolment demand which they are usually not in a position to meet.[3] Their existence invalidates (i) the rule calling for a balance between supply and demand in each quarter, (ii) the notion of cost

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[1] Ten or twenty years seem to be reasonable maximums, although the period has to be decided on in the light of the areas under study.

[2] The *lycées* in the Phnom Penh city centre enjoy a very large measure of prestige; experience shows that the *lycées* in the city outskirts are catering for pupils who achieve poor results in the entrance examination.

[3] An investigation of non-salary costs in secondary education in Uganda has shown that the more schools enjoy a certain reputation and are old-established, the higher the unit costs and the amounts of resources available; 'The official discrimination that was the rule before independence has given place to a *de facto* discrimination exercised through the level of fees, the schools seeking thereby to maintain their prestige and preserve their image as educational establishments for the children of the various élites.' Source: J. Chesswas, J. Hallak, 'Uganda: the behaviour of non-teacher recurrent expenditures' in *Educational cost analysis in action: case studies for planners—III*, Paris, Unesco/IIEP, 1972.

economies in connection with school transport, and (iii) the principle of homogeneity in the standard of education supply.

(3) Thirdly, schooling for the children of the shanty towns found in certain metropolitan centres throughout Africa, Asia and Latin America. By definition, a shanty town is an epiphenomenon; since it is temporary and eventually supposed to be cleared, it is usually treated as a provisional reality, without any final and costly solution being devised to remove it. However, shanty towns are hard to kill off and the number of people living in them sometimes accounts for an enormous proportion of the total population of the city on which they border. This is most dramatically illustrated by the city of Phnom Penh which, it is understood, had 800,000 refugees among its total population of 1,600,000 in 1974. This means that the conditions in which a very large number of children are receiving schooling are precarious, in many cases of an emergency nature, and that it is impossible to apply any satisfactory school-map doctrine. We might also mention an example from the study carried out on the city of Casablanca; the shanty town of the Ben M'Sik quarter goes back to the fifties and, far from dying away, has actually grown in size between 1960 and 1965 so that there are now 11,679 shanty-dwellings. Officially it is supposed to make place for a motorway and open spaces, and consequently it has been decided not to provide any site for the schooling of the children inside the shanty town precincts—where, in any case, building would give rise to a lot of problems, including the clearance of shanty dwellings, access to the site, provision of water and electricity, etc. For this reason, all the children are given schooling in schools located outside the limits of the shanty town.

(4) Fourthly, quite apart from the shanty town, any one town or city exhibits a certain 'specialization' in respect of occupation of its various sectors or districts; some are expensive and well-equipped and reserved for the rich, while others are reserved for the poorest strata of the population; sometimes, side by side with 'specialization' on the lines of economic categories, there is to be found a 'specialization' by nationalities (viz. the Chinese quarter or the Greek or Puerto Rican quarter) or by race (viz. the 'black' or 'white' or 'Asian' quarter).[1] The situation in the schools tends to reflect the situation in the quarter; this is obvious in countries with a decentralized school system, but less obvious in the others. Even if, at the outset, the standard of supply is homogeneous in respect of premises, teachers and furnishings and equipment, heterogeneity in cultural milieux as between one quarter and another, in motivations and in children's attitude to education very quickly causes great differences to arise from one quarter to another in the standard of school courses, school 'atmosphere', and the nature of the relationship which springs up and becomes consolidated between teachers and pupils. Consequently, 'specialization' finds its expression in a *de facto*, if not *de jure*, discrimination between the children of the various quarters of the town or city. It may even be inferred that the discrimination works only in one direction, that is to say, to the detriment of the under-privileged; children from well-off families have no hesitation in overcoming such obstacles as the need for transport, schooling fees and moving home in order to attend the schools they prefer.

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[1] Specialization along the lines of economic grouping is usually stricter than specialization by nationality or race, except in countries where a policy of apartheid is the rule. When the 'white quarter' is spoken of, what is meant is simply the quarter inhabited to the largest extent by 'whites'.

Everything considered, two sets of aims which are partially, or totally, contradictory are involved in the urban school map:

(i) that of minimizing distances and costs involved in transport, and making as rational a use as possible of the resources voted for education;

(ii) promoting the socio-economic integration of children inside school walls by combatting any *de facto* discrimination as between one urban quarter and another.

The two sets of aims obviously do not enjoy the same degree of priority in every country, nor in all socio-political systems. Rationalizing the school map by so creating catchment areas as to minimize distances to be covered and adjusting the number of school places to requirements seem to be of the highest importance in towns and cities where the cost of transport falls on children's parents and discrimination is economic, rather than social or racial. On the other hand, where social discrimination exists, and school transport has been, or may be, taken over by central or municipal authorities, it is integration and the fight against inequality as between one quarter and another that become matters of priority. Taking this situation as their starting-point certain school-map experts, especially in the United States, have proposed the creation of 'school complexes'[1] (or as they are variously called, 'educational parks', 'great high schools', 'super schools' or 'linear cities'). The aim here is to organize education supply by setting up giant complexes as an integral part of town planning. It is hoped that the large size of school complexes will make it possible:

(i) to get a better yield from expensive furnishings and equipment and qualified teachers and, at the same time, guarantee an optimum utilization of resources;

(ii) to promote the socio-economic integration of the children concerned by instituting a school-transport system, and getting children to a school from all parts of the town or city.[2]

As we have seen, experiments of this kind have been launched in a number of cities in the United States, including Pittsburgh, Brooklyn, Pontiac, Syracuse, Albuquerque, Berkeley, Seattle, etc.[3] Unfortunately, the results of these costly undertakings have not come up to the expectations of those who entertained them.

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[1] Cf. G. de Brigode, *L'architecture scholaire*, Paris, PUF, 1966, p. 58.

[2] This is 'bussing'.

[3] Source: G. Marker, op. cit. The attempt being made at the Parkway school in Philadelphia to combat the notion of 'school complex' has already been mentioned. Parkway is known as the 'school in the street' because it has no traditional school premises. Pupils 'take courses' in any part of the city and church crypts, museum rooms, and artists' studios serve as classrooms. Even the teachers are not all full-time. Most of the courses listed in the school's brochure are taught by people from various backgrounds, ranging from 'Planned parenthood' to 'Citizens' Committee on Public Education'; some of them are given on a voluntary basis.

Le Monde of 29–30 April 1973, from an article by F. Gaussen: Louisville (Kentucky). A large hotel in the city centre, bought by the school board. The vestibule and the spacious public rooms on the ground floor have been converted into 'open' classrooms and here 412 children aged from 8 to 16, in groups of various sizes, are engaged in various activities, such as the traditional subjects, music, modelling and 'constructions'.

Philadelphia (Penn.). A church crypt. Two hundred pupils between 14 and 18 belonging to a secondary school close by come to take lessons in the morning, and in the afternoon they go and work in the city's social service department, in hospitals, welfare service offices, schools, town-planners' offices, etc. These contacts with the work of professional people, which are sanctioned and taken into consideration in their school curriculum, are not considered as an

In particular, it quickly became clear that maintaining 'heterogeneity' in school attendance is tied up with the very large problem of 'urban stability'[1]. Stability cannot be brought about by the school system alone; it is tied up with the country's social policies and the options approved by the Government and the municipalities concerned. In any case the school map cannot solve this problem, regardless of the doctrine adopted for purposes of organizing supply.

On the other hand, it was soon realized that size does not automatically produce 'quality' in education; it is true that the use of certain equipment as advanced technological instruments is possible only when a certain 'critical mass' has been passed, but getting ten to fifteen thousand children under the roof of one and the same complex tends to dissociate the school from the environment and emphasizes its artificial character. This is why one of the major problems faced in certain countries is that of deciding on the maximum size for schools in the urban context.

To conclude this section, a comment on the relationship between educational planning and town planning. In urban areas, the educational planner is working in a geographical and social context which is continually changing and which is more or less determined by the policies of the town planners. Educational planners must be aware of the general needs of the urban system and adapt to them: conversely, the town planners must be aware of educational needs and adapt to them. The school map in urban areas thus requires close and continuous co-operation between town planners and educationists; this can be realized either by including a town planner in the school map team, or by having an educationist associated with the town planning department. Only in this way will any real progress be possible.

This chapter, like the preceding ones, has shown the extremely important influence of the environment on the principles, the theory, and the method of preparing the school map. Suggesting the provision of a new 'supply' or the modification of the existing 'supply' can never take place in a vacuum: the existing 'supply' is a function of the 'demand', which is determined by the environment; conversely, any change in the 'supply' will have an effect on both the 'demand' and the environment. This complex relationship must be borne in mind whenever the adoption and implementation of the methodology of the school map is being considered.

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apprenticeship, but have the object of giving the children an insight into the life of the community.

San Francisco (Calif.). A former photography agency. One hundred and fifty pupils from 15 to 21. After lessons in the morning, they have a choice in the afternoon of some educational activity in school such as photography, pottery or reading, making a visit to some place in the city, such as a museum, law court or cinema, voluntary or paid work in welfare or in the social centres, or else working on a college course or a programme of vocational instruction.

[1] In certain ghettos in Philadelphia families move four or five times a year.

The level of development a country's educational system has reached, and the conditions in which schooling is provided, vary from one province to another, and even inside each province from one region to another.

Relations between education 'supply' and 'demand' are not a one-way street; supply determines demand, and vice versa. *It is necessary to state clearly the nature of the supply (options, standards, legal status) and the characteristics of the demand, its volume, type, etc.*

The difficulties affecting the provision of education in rural areas are a function of the geographical and human milieu and of the attitudes of teachers and pupils to education. The organization of supply in rural areas is characterized by complex school-map formulas embracing a network of schools, ranging from central and satellite schools and those resulting from amalgamation procedures to small one-teacher schools and the isolated schools.

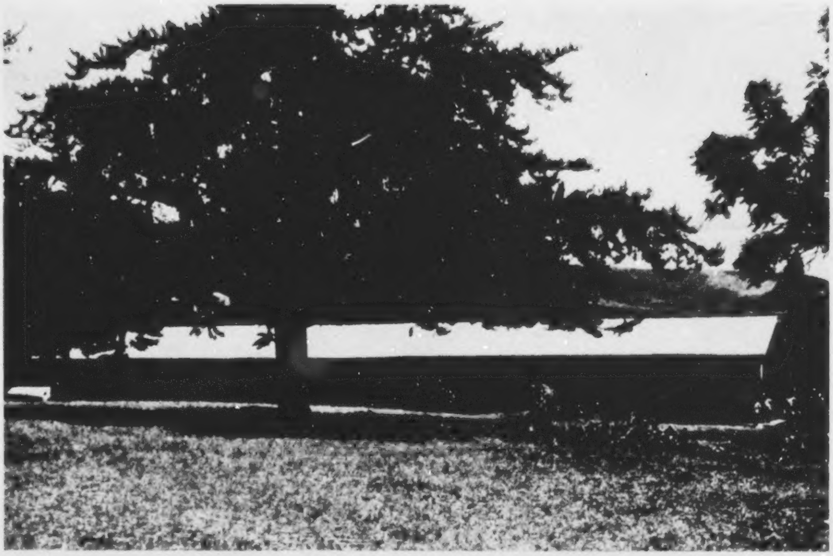
One-teacher schools have their advantages and disadvantages, and on this there is no unanimity of opinion; each country has to choose the solution which is most appropriate to the actual conditions prevailing.

The principal limitations of the urban school map are the scarcity of well-situated land and the high degree of mobility of children of school age. The solutions adopted are usually those dictated by the actual conditions prevailing in each town or city.

It would appear that the urban school map has to aim to achieve two purposes which are partially contradictory; that of using the available resources economically, while keeping distances from home to school down to a minimum, and that of promoting the socio-economic integration of the children in question. A great deal depends on the degree of priority awarded to these purposes.

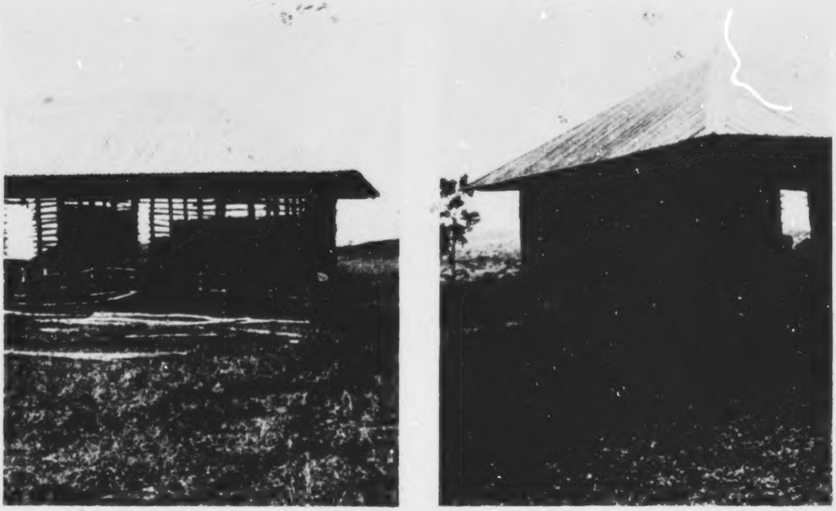
Illustrations

In the section that follows sixteen schools are illustrated, from eight of the countries surveyed in the foregoing chapters. The wide variety of conditions shown, from the strikingly contrasted rural schools of Iran and Sri Lanka to the overcrowded urban schools of Casablanca, is a graphic commentary on the problems which the school map can help to resolve.



(Photo: W. T. S. Gould)

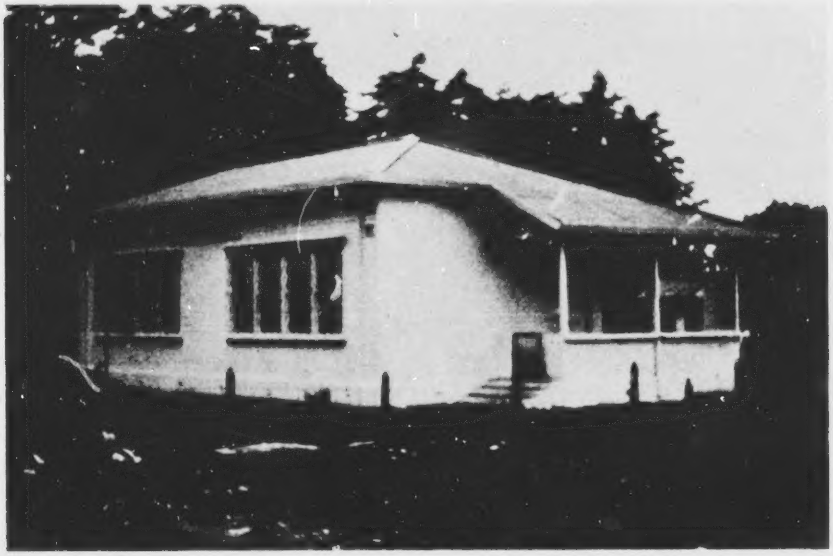
Ankole, Uganda: Kyeizooba Girls' School, a well-established brick building.



(Photo: W. T. S. Gould)

Ankole, Uganda: Kashaka primary school, built by traditional methods.
Left, during construction; right, the completed school.

Costa Rica: the largest primary school in the canton (with an enrolment of over 1,500 pupils), in San Ramón. *(Photo: Mario Garcia Segura)*



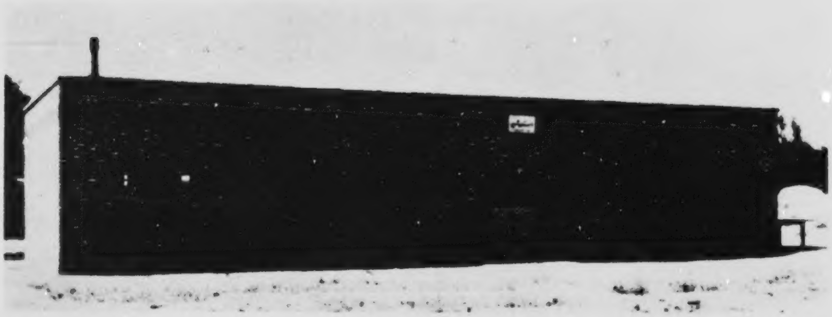
Costa Rica: Llano Bonito rural primary school at Cirrí, Naranjo. *(Photo: Mario Garcia Segura)*

Sri Lanka: open-air class at a typical rural school. *(Photo: Unesco/Paul Almasy)*

Sri Lanka: recreation time in a large urban school. *(Photo: Unesco/Paul Almasy)*

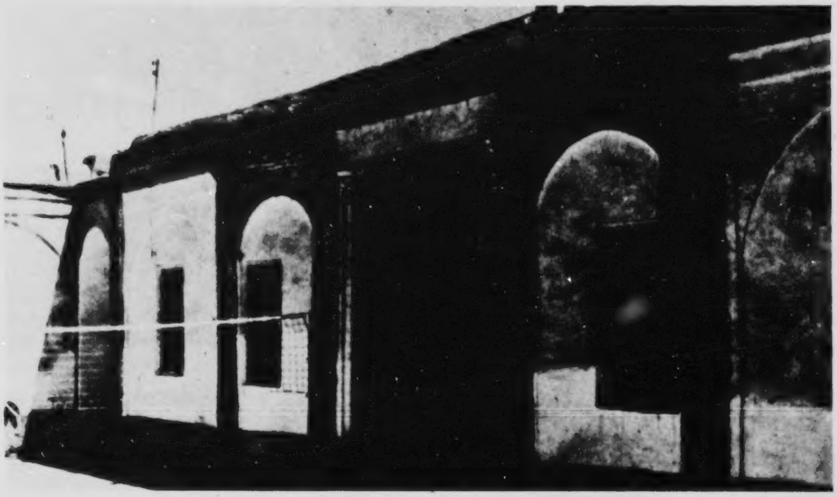
Ivory Coast: a new rural school *(Photo: Jacques Hallak)*

Ivory Coast: television in a rural school in Dabakala. *(Photo: Jacques Hallak)*

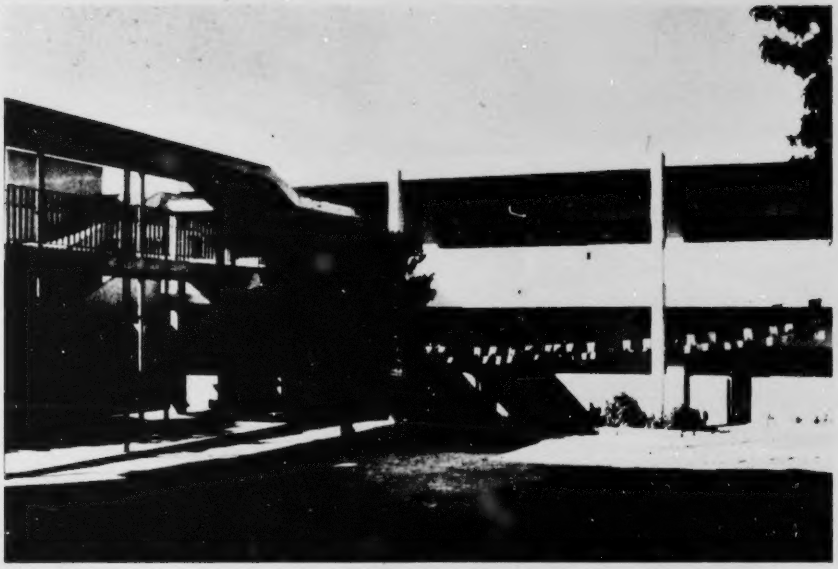


Chahroud, Iran: a Literacy Corps school, built of wood and brick. *(Photo: M. Aakhavian)*

(Photo: M. Aakhavian)
Chahroud, Iran: traditional wood and baked-mud construction in a village school.

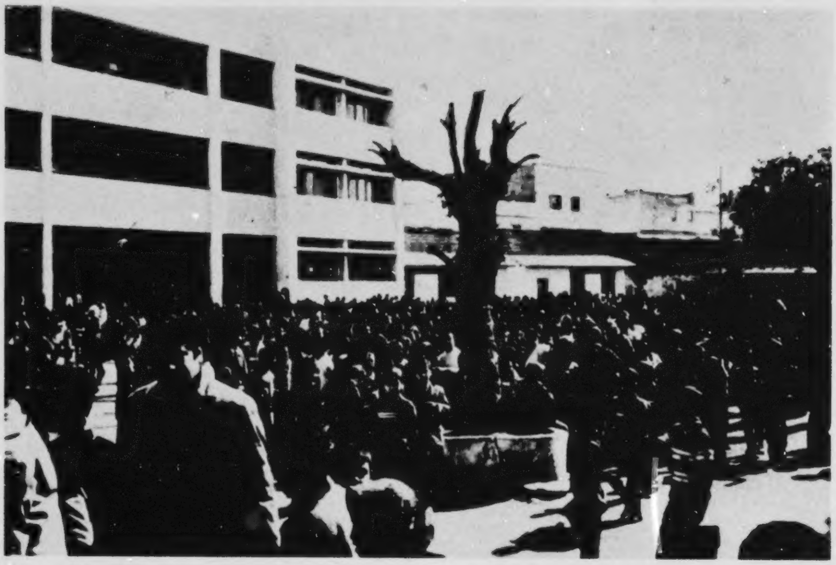


(Photo: M. Aakhavian)
Chahroud, Iran: a brick, baked-mud and wood construction school in poor condition.



New North Medina, Casablanca: Saad Bnou Abi Ouakass school (1,700 pupils). *(Photo: G. Porte)*

New North Medina, Casablanca: Abdallah Ben Messaoud School (1,700 pupils). *(Photo: G. Porte)*



Ben M'sik, Casablanca: changeover of shifts at Allal Ben Abdallah boys' school, which is attended by over 3,500 pupils daily. (Photo: G. Porte)

Aurich, Lower Saxony: a typical East Friesland volksschule. (Photo: Arbeitsgruppe Standortforschung)

Kaski, Nepal: a village in the valley of Pokhara. *(Photo: Jacques Hallak)*

Kaski, Nepal: a typical middle-cycle rural school *(Photo: Jacques Hallak)*

PART B

Methodology

After this treatment of the potential uses to which the school map can be put in educational planning and of the issues which it may help resolve, the reader may well be looking for an answer to the question of how the school map should be drawn up and put to use in his own country.

The five chapters which follow form an attempt to meet this need. Chapter VI deals with the practical side of introducing the school map. Chapter VII treats of two methodological concepts of primary importance at all stages of school-map elaboration, namely the catchment area and the standardization of educational establishments. Chapters VIII, IX and X each concentrate on successive stages in the drawing-up of the map, namely diagnosing the education system, forecasting how demand is likely to develop and putting forward proposals for supply.

In a work of this nature it is impossible to do justice in detail to all aspects of methodology. Moreover, a number of methodological techniques, including demographic projections, the analysis of school enrolments, and costs studies, which are of use when it comes to drawing up the school map, have already been dealt with in quite a large number of specialized publications;[1] again, each country will find it will have to take its own methodological steps to deal with features specific to its particular situation. In other words, each country will have to set up its own methodology (see Chapter VI). It is hoped, however, that the points which seem to be of greatest importance and susceptible of the widest application have been dealt with in what follows.

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[1] J. D. Chesswas, *Methodologies of educational planning for developing countries*, Paris, Unesco/IIEP, 1969; Ta Ngoc Châu, *Population growth and costs of education in developing countries*, Paris, Unesco/IIEP, 1972; Philip H. Coombs, Jacques Hallak, *Managing educational costs*, New York, London, Toronto, Oxford University Press, 1972.

VI. Adoption and use of the school map

Adoption and use of the school map in a given country will depend on the administrative, institutional, geographical, social, political, economic and other conditions in force. Consequently, there is no uniform or standard procedure which can be applied everywhere.

In practice, however, once national differences have been taken into account, the school map may be introduced in what are basically four self-contained stages:

(1) administrative organization;
(2) preliminary investigations and pilot exercise;
(3) training programme for those drawing up the map;
(4) implementation.

1. The organizational problems

(a) Where is the school-map central department to be located and what will be its relations with the educational-planning and pupils' guidance departments, and the other central and local departments concerned?
(b) How will the school-map department work in practice; is it to be a board with representatives from various sectors of society? Or a body responsible for carrying out the Plan?
(c) Who will supply the statistical data? Who will centralize them? Who will analyse them? And how are they to be co-ordinated?
(d) What is to be the time-table for drawing up and revising the map?
(e) At what level will successive decisions be taken? And what consequences are likely to follow for the circulation of information between the various levels at which decisions are taken?

There is, of course, no simple answer.

Costa Rica, for instance, has no school-map department as such, but does have a 'physical planning' unit as part of the Ministry of Education's Planning Department. Nor is there a school map board; decisions about the location of schools are taken by the Ministry of Construction.

By contrast, in the Ivory Coast, school map boards oversee the primary-education development programmes and the work they do covers (i) rational provision and organization of school-places for children in relation to those eligible for schooling in a given district, and (ii) investigation within a uniform general framework of a structure permitting improved linking-up of the types of education to be provided.

The responsible governing bodies include the *département*[1] boards based in the *préfecture* town or city and chaired by the *Préfet*,[2] with the regional director of education acting as secretary-general; the special board at Abidjan chaired by the mayor of that city; and the national board, a supreme authority chaired by the Minister of Education and with powers of final decision.

In Morocco, at the national level, the school-map department is part of the planning division of the Ministry of Education. It programmes on an annual basis the supply of facilities and equipment provided for by the development plans and in this way ensures that the necessary infrastructure is in place to receive new students. It also participates in research undertaken and directed by the investigations and purposes division into school-map methodology and its organization. At the regional level, twelve sections covering the whole country are responsible for applying the directives issued by the central administration; in the matter of the school map these regional sections work in conjunction with the bodies responsible for national development and in particular with those engaged in town planning; they assist with investigations for the reservation of land for school building and also oversee the building of what is provided for under the building programmes.

Strictly speaking, Lebanon has no school-map department; but an *ad hoc* working party has been set up in connection with the work being done on schools amalgamation. This working party bears the responsibility of diagnosing the Lebanese education system and drawing up a school-map rationalization project.

Uganda and Sri Lanka have no regional school-map departments, nor any permanent central body dealing with the map, although in certain connections the Ministry of Education keeps a close eye on the way geographical distribution of supply develops.

The USSR, Bulgaria and Poland have full-fledged administrative structures; the primary, specialized-secondary and higher-education maps are the business of central and regional school-map departments which are guided by specialized school-map boards and/or work on the preparation of decisions to be made by the specialized map boards.

As these few examples show, it is impossible in a work such as this to provide anything more than a few notes on the principles of administrative organization; contexts vary enormously from country to country, and dictate accordingly the different organizational methods that have to be adopted.

Principle No. 1: *Level of responsibility and specialization*

It is advisable to organize school-map departments in relation to the degree of responsibility they bear. More precisely, the higher-education map can be the business of a single department with national responsibility; this department links up 'vertically' with the other departments of the Ministry of Education—in particular with the long-course secondary- or/and post-secondary-education map department and human-resources planning department; and 'horizontally' with those officials in charge of national and regional development and those heading other administrative departments concerned.

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[1] *Département:* one of the main administrative divisions of a country, as in France which has 95 *départements*.

[2] *Préfet:* the highest national civil servant appointed to a *département*.

The map for vocational and technical education services can be devised and put into effect only by a central department bearing national responsibility. To be sure, a close link-up at local level with school administration councils and at regional level with vocational and technical-training committees is essential, but the task of estimating manpower needs by specialization and trade, together with the desirability of avoiding 'over-production' or 'under-production', make it imperative that the main bulk of consultation takes place with vocational and inter-vocational boards at national level. Both commonsense and experience indicate that work on the specializations map has to be fairly pragmatic, permitting constant re-appraisal and adjustment in the light of the existing situation. Once account has been taken of the way employment levels are moving, nationally, regionally and locally, steps can be introduced:

(a) to slow down training schemes where outlets are diminishing;
(b) to transfer a section from one region to another;
(c) to further develop existing training schemes for trades experiencing expansion and open up new sections or schools;
(d) to create specializations corresponding to new requirements, etc.

A special administrative unit is required to see to the map of education services for handicapped children, by reason of the special nature of the clientèle for which they are devised, the very high financial cost involved and the necessity of highly individualized methods for identifying and dealing with the children concerned.

This identification can be carried out only at local level; the low numbers of children involved, amounting to 5 to 6 per cent of each age-group, calls for co-ordination of methods at regional level, while the high cost of arranging for suitable premises has to be borne by central administration. Finally it is desirable, if not imperative, to integrate the map concerned with the health-services map and to consider entrusting the organization of the composite chart to an inter-ministerial body involving, in particular, the Ministries of Education and Health.

The map for middle and secondary education services calls for administrative structures at central and regional levels, while the primary-school map presupposes that such structures will be extended to cover the local level as well. The 'standardized' nature of the primary, middle and secondary education services provided in each region of the country for the age-group concerned makes it possible to represent such services by means of a pyramidal-type structure; at the top of the pyramid one finds the national authority taking final decisions, fixing regulations and devising standards for premises and the facilities in them, as well as setting the criteria governing the location of schools, the various means of organizing school-transport and so on. At the base, almost identical bodies deal with the question of supply in primary schooling; while higher up the pyramid are located the regional services mainly responsible for seeing that the middle and secondary-education map is put to use.

The practical organization of school-transport services (without which a school map cannot be put into effect) calls for a number of definitions, as follows:

(1) Catchment areas: the yardstick here is travelling time rather than distance covered (maximum travelling-time is generally fixed at 45 minutes).

(2) The organizing authority for transport—generally one of the following:

  - (a) the school;
  - (b) the commune or a group of communes;
  - (c) the *département* or the province;
  - (d) pupils' parents associations, etc.

(3) The form of transport management:
  - (a) calling on the services of a private transport company (with contract);
  - (b) self-owning of vehicles, by school, commune, *département* or association.

(4) Technical control of vehicles used (specifications and inspections).

(5) The method of financing:
  - (a) the need to secure central financing in view of the fact that the school-transport services operate in country districts;
  - (b) the usefulness of a contribution from local authorities and even from pupils' families (thereby creating an interest in seeing that the system is properly managed).

Principle No. 2: *The differentiation to be made between urban and rural districts*

The arrangements described in the preceding section relate in the main to schooling outside towns and cities. In urban areas a special organization for school-map services should be set up so that the special requirements and features of towns and cities can be taken into account. The difficulty of acquiring land, high building costs, and the degree of influence of urban municipalities will all have a large bearing on the way school-map services are organized in urban conditions.

Whereas in rural areas school-map departments will be part of regional branches of the Ministry of Education, in the shape of offices of heads of universities or secondary-school or *départemental* inspectorates, in urban areas they may come directly under the town hall or the municipal town-planning departments. In towns and cities with a particularly dense population it may be difficult to expand the supply of education in the older quarters without resorting to expropriations: this implies that school-map departments should be given wide powers or, at the very least, that arbitration in their favour should be assured if they come into conflict with other public or private bodies. (The case of the expansion of the primary-school map in the city of Casablanca is by no means exceptional: land had to be 'recovered' that belonged to the army, to a mosque, and to an old market!) When new quarters of a town or city are laid out regulations should ensure that land is set aside for the schools needed in them; legislation will undoubtedly be needed for this, but it will also be necessary to ensure the close collaboration of all the municipal (and urban) authorities concerned with planning new quarters, and particularly the school-map departments.

Finally, given the considerable influence of the schools catering for post-compulsory schooling in both urban and rural areas simultaneously, a guarantee is desirable of equal rights of admission for all the children in their catchment areas, wherever they may live. This creates problems in connection with the practical organization of school-transport services and the possible setting-up of canteens or boarding establishments; above all, it raises the problem of children's admission 'quotas' according to the places where they live. And these are problems which cannot be solved, unless disadvantages are to be accepted, by the urban departments concerned acting on their own.

To sum up, the corollary of this principle of differentiation between urban and rural areas is:

(a) that it is necessary to ensure the integration of the school-map departments in an urban area in the overall framework of urban planning;

(b) that it is possible to attach the school-map departments in rural areas to the regional branch offices of the Ministry of Education;

(c) that it is desirable that the 'top brass' of the school-map departments, and particularly those dealing with the post-compulsory schooling period, should be senior officials given wide powers both as concerns the general business of planning for the urban area and also as regards the general organization of the supply of education regionally and nationally.

Principle No. 3: *Observing the distinction between 'technical' and 'political'*

A distinction has always to be made between technical departments, i.e. the school-map directorate or sub-directorate at central and local level, and political bodies, that is to say national and regional school-map boards. The technical departments prepare files, carry out analyses and put forward proposals; their driving force is the civil-servant school-map technicians, who may act as secretaries to the boards. In their work of compilation of data, analysis, and integration with the Plan's objectives, they will seek support from the administration's other technical departments; which means, at central level, the directorates dealing with education statistics, studies and objectives, etc. and, at local and regional level, school inspectorates and administrative officers, etc. On the other hand, we also have the boards composed of representatives from the various groups affected by decisions taken on the school map, i.e. teachers, pupils' parents, members of political parties, etc. The powers of the boards will vary from one country to another, ranging from a mere consultative rôle up to authority to take decision. In the latter case, membership must include not only representatives of the Ministry of Education but also responsible members of most of the other ministries concerned, i.e. finance, public works, building, regional development etc.

Principle No. 4: *Avoiding piecemeal decisions*

An essential aim is to avoid complexity in the decision-making process. If one is to believe a recent study on France, the building of a lower secondary school, costing from one to five million francs and of the kind put up in their hundreds every year, demands a 24-stage procedure and decisions on the part of 14 individuals or authorities. This is a typical example of piecemeal decision-taking, with no one person deciding or assuming responsibility, and consequently with no control by the user and no political control; it is a state of affairs that must be avoided. At the time when the school map is being introduced, a close examination of current procedures is indispensable; their shortcomings must be brought out and such administrative reforms envisaged as facilitate the application of the principles of the school map. These reforms can be decided on only at the highest level. In almost every country they are a *sine qua non* for bringing in the school map and for setting up efficient administrative units to see it is put into effect.

2. The pilot exercise

A method for the drawing-up of the map of specialized education services, i.e. vocational, technical and higher, and for physically and mentally handicapped children can be settled on following a number of empirical tests at national level. This procedure does not apply to the map of standardized education services, where the need is for a uniform method applicable to all areas in the country. In this case a pilot exercise is necessary.

The object of the pilot exercise is to devise a methodology applicable to the country as a whole. It will need to be carried out in a region as representative as possible of the range of existing situations. There is no question, of course, of including towns and cities here, because for school-map purposes the state of affairs in each town or city has to be investigated in its own right.[1] The best way to proceed is to make a preliminary study of the various regions of the country in respect of a number of important criteria, such as physical relief, population density, distribution of inhabited localities, communications network, level of development of the school system, etc., and to choose the region which comes nearest the national average. For example, the region of Chahroud in Iran—composed of mountainous, plateau and desert areas—is very typical of the physical relief and population distribution of the country as a whole. In the Zahlé area, occupying a plain under a mountain range, one finds a great variety of creeds, as one does throughout Lebanon. Again, the Ankole district, with its varied physical relief and economic activities (national parks, livestock breeding and agriculture) typifies life in Uganda, while County Sligo is fairly characteristic of Ireland.

Once the pilot region has been selected, the next step is to set up a team to undertake the investigation. This team should represent many disciplines and include a geographer, a statistician, an economist, a demographer and representatives of the central planning department and of the pilot region itself. The representative(s) of the pilot region should be the 'king-pin' of the study: its extension to all the regions of the country will depend upon obtaining the active co-operation of the regional services of the Ministry of Education.

If the investigation is to justify itself, it should satisfy the following provisos:

(a) Determine the specific data available and indicate where they may be obtained. Thus, the national development department of the Ministry for the Plan might be consulted for development prospects; the central statistical department for data on population distribution; the roads directorate of the Ministry of Building for road-building projects; the regional education directorate for numbers of children in schools; the premises and facilities department of the Ministry of Education for the condition of school premises, and so on.

(b) Arrange for collection of non-available statistics. Here, three general principles hold good for all countries:

(i) uniformity in inquiry procedures and drawing-up of questionnaires. The highest possible degree of consistency should be aimed at in the statistics used, and any overlapping of inquiry procedures must be avoided.

(ii) limitation of inquiry activity to such information as is required at each level for the decisions to be taken there. For instance, it is pointless to ask in a national level questionnaire how many tables and chairs there are in a classroom; no possibility exists that action can be taken at the national level in respect of a given individual school, whereas at the level of the school-district such information may have its utility.

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[1] Not so much that methods of diagnosing, estimating and preparing proposals differ greatly as that the most important parameters are usually peculiar to the city in question.

(iii) possibility of cross-checking information or of checking on the spot. To illustrate the point, the tables in the Appendix to this chapter throw light on the questionnaire that was used in Ireland for the Sligo area investigation.

(c) Decide what maps are to be used and to what scale; certain countries propose working with 1/200,000 maps, others with maps of the order of 1/50,000. Actually, everything depends on the maps available; in France maps are published by the Land Register Department, in Algeria by the National Geographical Institute, in Iran by the Ministry of Defense, in Costa Rica by the Population Census Bureau, and in Morocco by the National Development Office. Elsewhere, other bodies may well be concerned.

(d) Settle on the parameters to be taken into consideration; the pilot exercise must simplify as much as possible the work of drawing up the school map at national level by concentrating on significant variables. In most countries data on births and population movements are basic to forecasting the number of children for primary education; information on the road network is needed to formulate proposals about where schools are to be located, and data on the goals set for admissions to first-cycle second-level education and to second-cycle optional courses are required in order to forecast the number of school places required; finally information concerning minimum-size standards for schools is needed in deciding on catchment areas and the actual setting-up of a school network, etc.

In each country, however, other specific variables may assume primary importance. In Nepal, for example, the legislation on teachers' salaries nullifies the effect of reducing the number of years of primary schooling from five to three, because all those teaching classes 4 and 5 become teachers in the middle school and qualify for much higher rates of remuneration by simply changing their category, even if their jobs and their qualifications are unchanged; in Sri Lanka school-age children are grouped according to the language they speak, i.e. Sinhalese or Tamil, and this grouping is of great importance when it comes to deciding the sort of school to be provided. In Germany the kind of school attended, i.e. *Hauptschule*, *Realschule* or *Gymnasium*, is a vital factor in forecasting the numbers to be admitted to the various second-cycle optional courses; the same is true of Austria. In the Ivory Coast, on the other hand, the programme for setting up 'distribution relays' is an essential variable for those making forecasts in connection with nation-wide educational television, etc. In the case of Iran, the relative numbers of teachers of each sex is a parameter of great importance in accounting for the different rates of school frequentation by girls and boys, particularly in country districts; in Lebanon and Uganda the religious affiliation of the schools greatly influences the size of catchment areas, etc.

(e) Establish a small methodology manual to show how the map should be drawn up. This manual should set forth:

(i) everything which has to be taken into consideration in making a diagnosis of the current school map, namely the level of development reached and the conditions (pedagogic, administrative and economic) affecting the provision of schooling. For instance, it should indicate the method used for calculating teacher/pupil ratio, the length of time premises are utilized and to what degree of intensity, together with apparent and actual participation rates, etc.

(ii) demographic studies relating to education; it is advisable to recommend a simple method of projection to be followed by those in charge at regional level, and to draw attention to the sources of demographic information to be used as a starting-point. As an example, the following page contains an extract from a French administrative circular showing how the number of those due for schooling is to be estimated in a simple manner.

(iii) empirical techniques for formulating proposals and cost-evaluation procedures and assessing the relative advantages of the various proposals put forward. Simple costs/advantages balance-sheets need to be drawn up. The effects of possible decisions in terms of resources required may be used as cost criteria; the speed with which a reform can be effected or the degree of consistency between the map of school premises and that of regional-development centres may serve as parameters for measuring the advantages of this or that solution.

In any event, it is the pilot exercise which makes it possible to launch the preliminary training programmes without which the school map cannot be introduced.

3. The training programme.

One of the most important features of the procedure for drawing up the school map is that regardless of the administrative system in operation, the work cannot be done exclusively at the centre. Even in a country like France, which is considered to be very centralized, the bulk of the work is done not centrally, but at the level of each schools' inspectorate. Decentralization is necessary first of all because of the mass of detailed reliable information that has to be processed and secondly, because certain vital social and political features can be identified and dealt with only at local level.

In practice, it is necessary to provide for training programmes both at central headquarters and for local civil servants. The part played by universities and training and research centres in this connection can be of great importance in certain countries.[1] Without wishing to impose a single pattern on every country, one would expect the programme to cover:

(a) the main problems faced by the country's school system;
(b) the reform measures envisaged, and the interpretation of them in the school-map context;
(c) the school-map procedure;
(d) the methods of making a diagnosis;
(e) the methods of projecting the numbers due for schooling;
(f) the criteria for locations and the elaboration of proposals;
(g) the techniques used in comparing the various proposals put forward.

Figure 4 in the general introduction depicts the procedure followed in drawing up the school map. All that is necessary is to familiarize the civil servants concerned with each feature of it, while filling them in on the work they are expected to do.

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[1] In Poland all school-map investigation work is co-ordinated and followed up by the Gdansk (Danzig) University's Institute for Economic Sciences.

France: extract from an administrative circular

First of all, decide on the list of chief towns by sector; these will usually be chosen from among those listed in the Rural Development Plan, which should be consulted. These chief towns will be provided with a basic schooling apparatus consisting of a 13-division first-cycle unit. Each sector must embrace a population large enough to supply the State education system with a hundred children per age-bracket, assuming 100 per cent frequentation at observation-cycle level; that is to say, the sector must have at least 5,000 inhabitants.

This operation will involve an estimate being made, canton by canton and even commune by commune, of the number of children due for schooling in the first cycles in 1970.

Here again, the INSEE[1] orange volume will be found to provide valuable information. In either Tables I (communes classified by arrondissement and by canton) or Tables II (towns and urban areas) column *r* on the left-hand page gives the total number of births in the eight years between the two census dates; during the period in which the Vth Plan is being carried out and the years to follow, these are precisely the children who will be in the first cycle at the rate of four generations on average per year.

As a first estimate, then, for a canton untouched by population movements, one could say that the number of children in the first cycles in 1970 will be equivalent to $\frac{r}{2}$ minus the numbers of the handicapped, i.e. eight per cent on average.

The INSEE demographic department advises using the following formula, which takes account of two things: firstly, that the figure in column *r* is that of all births between 1954 and 1963; secondly, that population movements will alter population distribution between now and 1970. If PS_{71} is the number of those embraced by four age-years on 1 January 1971, the formula is as follows:

$$PS_{71} = \frac{r}{2}\left(1+2\frac{u}{q}\right) : \frac{u \text{ being the balance of population movements}}{q \text{ into and out of the sector.}}$$

A good method of training is to arrange for a representative of the education office of each country district to take part in initial work on a school district, for instance in the pilot region. Ultimately this man will be called upon to do the same piece of work in his own district.

To begin with, a brief training session of one or two weeks should be held for all the civil servants concerned. Here, local civil servants will be put in touch with the responsible members of the Ministry of National Education's central administration departments and with members of other ministries, and provided with opportunities for exchange of information. The meeting can also be used to present the manual and those instructions issued for the guidance of civil servants in the work they have to do.

After this brief training session, the team of local civil servants will jointly undertake an investigation of a school district. A final session devoted to evaluation and concerted reflection will bring the training programme to an end and also serve as a prelude to the practical launching of the map.

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[1] *Institut national de la statistique et des études économiques.*

Although what is being done in Algeria differs somewhat from this programme it affords interesting lessons. The training given, which was initiated three years ago, is aimed at the *wilaya* school-map deputy directors. It takes the form of small seminars lasting one to two weeks, with all the *wilaya* deputy directors turning their attention to a precise facet of the school map. A regular bulletin on educational planning and the school map will facilitate circulation of information concerning the experience gained and difficulties met with at inter-*wilaya* and central-administration levels. In addition a seminar was organized in 1974 to examine and critically discuss the Bouira pilot project and to make any changes necessary in the methodology used. Next, the deputy directors of each *wilaya* chose a pilot region. The first results of the situation diagnosis in the various pilot regions were discussed at a seminar in 1975: following this second seminar, the project for nation-wide application of what has been achieved at Bouira will be presented and seminar participants will be able to make amendments to it before it is launched. A subsequent seminar will be devoted to the difficulties met with while the map was being put into effect throughout the country.

4. *Implementing the map.*

Once the necessary steps for drawing up the school map have been approved by the legislative body concerned, a start can be made on implementing the map by setting up a precise time-table of the operations to be carried out. This time-table should take into account the other responsibilities customarily falling on the local civil servants, which in the main means the work they have to do for the beginning of the school year.

With the instructions and the manual as a guide, each local office makes an initial diagram showing the home-places of school-age children on a skeleton map on the scale decided on. The local or regional development offices and the regional boards present their recommendations. The local or regional government office examines the recommendations and redefines the proposals in terms of school centres with their technical specifications; for example a second-level first-cycle co-educational school, a second-cycle girls' secondary school, or a one-teacher school. The proposals are then discussed at local and regional levels with representatives of the various social groups concerned and may lead to an agreement in the shape of a classified list of the proposals such as follows:

(a) schools to be set up as a matter of priority and for which localities have already been chosen;
(b) first-priority schools, the localities for which are still undecided;
(c) schools still under discussion and for which localities have not yet been chosen.

A possibility exists that the financial resources made available as a result of the financial vote for the administrative district will do no more than cover the setting up of the premises in category (a). Where such an allocation is lacking an arbitration procedure will become necessary at local, provincial or, if necessary, central level.

Once the final decisions have been made the next steps are:

(a) to plan building operations and the supply of physical facilities;
(b) to adjust the rates at which these operations are completed to the schooling programme envisaged in the education plan.
(c) to synchronize this procedure with the procedures for drawing up the annual budget and the plan. In other words, it is desirable to have the map come into effect at the beginning of a school year and at the time medium-term prospects are being worked out.

If one takes into account the time spent on drawing up the map and construction delays then one may allow for a minimum of three years between the moment a country decides to introduce the school map and the actual achievement of nation-wide application of the scheme:

administrative organization and setting up the school-map department	a minimum of six months.
pilot study	a minimum of six months.
training programmes	a minimum of three to six months.
plan for nation-wide application	a minimum of one year.
initial operations for implementation of plan	a minimum of three to six months.

Since the task of introducing the school map is a complex one, one cannot expect to complete it successfully in a very short period of time. As we have seen, it entails problems of structure (central administration), of method (the pilot study), of co-ordination in the gathering of information, of training, and of negotiation procedures at the local level, all of which have to be resolved in empirical fashion.

How helpful in this respect is the research work completed on the school map in various countries?

Taking fourteen case studies covering twelve countries, we find that only three of them relate to current experience and practice. These are the studies on USSR, Sri Lanka and Morocco. Three others have served as a basis for methodologies with extensions relating to the introduction of the school map. But nearly half the case studies failed to produce concrete action; at best, they facilitated examination of a problem of education policy or opened the school-map issue to public discussion. The main reason for this state of affairs lies in the conditions under which the investigations were undertaken, that is to say, not at the request of the countries concerned, and therefore without their commitment, but solely on the initiative of IIEP.

To sum up, the school map is not a panacea and will not itself lead to a solution for educational problems. It is an 'instrument' and a 'means to an end' rather than a 'target'. The efficacy of this 'means to an end' depends for the most part on the underlying political will, on the measures taken at the moment of its adoption, and on the care with which it is enlisted in the service of educational planning.

The school map should be introduced in four stages more or less independent of each other according to the country concerned. They are as follows:

1. Administrative organization. Here there are four principles to be observed, the principle of establishing the relative importance of the departments and services concerned while ensuring that they are specialized in their functions; the principle of differentiating between urban and rural areas; the principle of distinguishing between technical departments and political bodies; and, lastly, the principle of avoiding complicated situations when it comes to decision-making.

2. The devising of a methodology by means of a pilot exercise carried out in a representative school district.

3. The training of staff to deal centrally and at regional and local levels with the drawing-up of the maps and their consequent implementation.

4. The fixing of an exact timetable for all steps to be taken, so that they do not clash or interfere with the other work done by the administrative departments concerned.

Since the work needed to make the school map operational is complex, one may expect a minimum of three years between the date of its being decided on in principle and the time of its nation-wide application.

APPENDIX

Questionnaire forms used in County Sligo, Ireland

Appendix

Questionnaires for the first and second levels, including explanatory instructions, were prepared to elicit relevant data for each school in County Sligo. They were framed to yield information under the following main headings: (a) physical facilities; (b) enrolment trend and age-distribution; (c) school transport; (d) teaching staff; (e) recurrent expenditure and financing;

The questionnaire on *physical facilities*, as used for first- and second-level schools, is shown in Form 1.

FORM 1. School questionnaire on physical facilities

A. GENERAL

Name of school ....
Ownership ....
Year built .... Extended .... Renovated ....
Grounds (in acres) ....
Total classrooms ....
Total pupil-places ....
Total classes ....
Total teachers (full-time equivalent) ....
School session (in days) ....
Rooms rented 1970/71 ....
Building in progress (no. of rooms) ....
Number of pupil-places ....
Ready for use ....

☐ Day
☐ Boarding
☐ Girls only
☐ Boys only
☐ Co-education

☐ Public
☐ Private
☐ Catholic
☐ Protestant
☐ Non-denom.
☐ Other

Enrolment	
1966/67	....
1967/68	....
1968/69	....
1969/70	....
1970/71	....

Building extension possible? Yes/No
Adjoining land acquisition possible? Yes/No
Other land acquisition possible? Yes/No

B. TEACHING AREA (Modern, adequate or obsolete)

General		Special			Gym/gen. purp.		Library		Swimming pool	
Trad.	Pre-fab	Sci. lab.	Workshop	Lang. lab.	Trad.	Pre-fab	Trad.	Pre-fab	Indoor	Outdoor
M	M	M	M	M	M	M	M	M	M	M ....
A	A	A	A	A	A	A	A	A	A	A ....
O	O	O	O	O	O	O	O	O	O	O ....

C. TEACHING EQUIPMENT

☐ Closed-circuit TV
☐ TV
☐ Radio

☐ Cine projector
☐ Overhead projector
☐ Strip projector

☐ Tape recorder
☐ Record player
☐ Other

☐ Library (no. of vols.) ....
☐ Public library ....
☐ Other ....

D. ANCILLARY AREA

	Number	Dimensions (ft.)
Administration		
Headmaster's room	......	.... × ....
Vice-head's room	......	.... × ....
Secretary	......	.... × ....
Medical	......	.... × ....
Other	......	.... × ....
Staff		
Rest room(s)	......	.... × ....
Cloakroom	......	.... × ....
Sanitary		
Staff	......	.... × ....
Pupils	......	.... × ....

	Number	Dimensions (ft.)
Pupils		
Reception	......	.... × ....
Shop	......	.... × ....
Canteen	......	.... × ....
Cloakroom	......	.... × ....
Maintenance		
Caretaker's room	......	.... × ....
Storage	......	.... × ....
Boiler room	......	.... × ....

E. SERVICES

Water
☐ Mains piped
☐ Well pumped
☐ Other
☐ Drinking water
☐ Showers (No.) ....

Sewerage
☐ Main sewerage
☐ Septic tank
☐ Latrine
☐ Other

Light
☐ Electric
☐ Other

Heating
Central heating
☐ Oil
☐ Solid fuel
Fireplaces
☐ Coal
☐ Peat
☐ Other

F. OUTDOOR FACILITIES

Major games (football pitches, etc.) No. ....Area ....(acs.)
Minor games (basket-ball, volley-ball, tennis, etc.) ....Tarmac .....sq. ft.
Other ....sq. ft.

Dressing rooms, Dem. rooms ......
Parking space ....sq. ft. Tarmac ....
(private) Other ....

G. BUILDING PLANS

	Decision to build (date)	Department of Education sanction to proceed (date)	Drawings and plans sanctioned (date)	Sanction to seek tenders (date)	Building to start (date)
Replacement	....	....	....	....	....
Extension	....	....	....	....	....
No. classrooms	....				
Pupil-places	....				

Data under the *enrolment* and *age distribution* headings were provided in questionnaires framed as Forms 2 and 3.

FORM 2. Enrolment trend.

Year	Sex		First-level grades						
		Pre-first level	I	II	III	IV	V	VI	Total
1966/67 ...	M	....	....	....	....	....	....	....	....
1970/71	F	....	....	....	....	....	....	....	....

Year	Sex	Second-level grades													
		1st year		2nd yr.		3rd yr.		Total lower stage		4th yr.		5th yr.		Total higher stage	Grand Total
		Day	Boarding	D	B	D	B	D	B	D	B	D	B	D	B	D	B
1966/67	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1970/71	F	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

FORM 3. Age distribution of enrolment

			First-level grades 1970/71						
Year born	Age	Pre-first level	I	II	III	IV	V	VI	Total
1967	4	....	....	....	....	....	....	....	....
1966	5	....	....	....	....	....	....	....	....
...									
TOTAL									

	Second-level age-group																	
	11		12		13		14		15		16		17		18		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1966/67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1st year	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2nd year	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3rd year	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4th year	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5th year	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1970/71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

For higher-stage second-level enrolments, questionnaires were also provided to give data on the subject-group alternatives pursued, as in Form 4.

FORM 4. The choice of higher-stage subject alternatives.

	Language		Science		Busn. studies		Technical		General		Total	
Year	M	F	M	F	M	F	M	F	M	F	M	F
1966/67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
...												
1970/71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Questionnaires asking for data on school transport were framed in the light of the regulations governing the school transport scheme in Ireland and were similar for first and second levels, with the exception that two and three miles respectively were taken as the distances beyond which pupils became eligible for free transport. The headings were as shown in Form 5.

FORM 5. Second-level transport, 1970/71

	Under 3 miles					Over 3 miles					Other CA				Boarders			
	Walk	Bicycle	Pub. bus	Sch. bus	Other	W	B	PB	SB	O	B	PB	SB	O	Under 3 m.	Over 3 m.	Other CA	Other Co
M	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
F	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

FORM 6. Teaching staff, 1970/71

	First-level lay		First-level religious		
	Trained	Untrained	Trained	Untrained	Total
M	....	....	....	....	....
F	....	....	....	....	....

	Second-level lay		Second-level religious		Total	Full-time equiv. teachers
	Full-time	Part-time	Full-time	Part-time		
M	...	...	...	...	...	...
F	...	...	...	...	...	...

FORM 7. Teaching-staff qualifications, 1970/71

Arts				Science				Busn. studies				Technical			
A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
. .	. .	. .	. .	.	.	.	. .	.	.	.	. .	.	.	. .	. .

A = Master's degree; B = Primary degree; C = Teacher-training course; D = Pedagogical qualification.

FORM 8. Recurrent expenditure, 1970/71 (£)[1]

Year	Teacher cost	Non-teacher cost				Total
		Admin.	Maint.	Trans.	Board.	
1966/67	. .	. .	. .	. .	. .	. .
...						
1970/71						

[1] Data on recurrent expenditure and financing available only from the public schools; additional data in this regard was provided by the Department of Education.

FORM 9. Recurrent financing, 1970/71

	Public			Private		
	Dept. Educ. grant					
Year	Salaries	Capitation	Local auth.	Fees	Other	Total
1966/67	. .	. .	. .	. .	. .	. .
...						
1970/71						

VII. Two useful concepts: catchment area and standardization

In dealing with the methodology of the school map, a special place has to be set aside for two useful and complementary concepts, namely: (a) school catchment areas; and (b) standardization of premises and physical facilities.

A. The catchment area

1. What is the meaning of this term?

A catchment area is the geographical area served by a school. In order to delineate it, pinpoint pupils' homes and outline the smallest area covering all of them. Two possible extreme cases may be mentioned, namely:

(i) the case of a single school for the entire country providing very specialized training, for instance, repair and servicing of watches; such a school's catchment area will be the whole of the country; and,

(ii) the case of a nursery and primary school, for instance, for the children of workers maintaining a hydro-electric power station dam; here the catchment area embraces the dwelling-houses in the neighbourhood of the dam.

In either case, the catchment area is defined by what is expected of the school, namely 'serving such and such a category of people' or 'providing special training'.

As a rule, however, the vast majority of schools are supposed to be fulfilling the same function, for instance providing basic education for children from 6 to 12. In this instance the school's catchment area is defined by the maximum acceptable distance a child can travel between home and school, the size of the school, and the density of school-age population; this is particularly true of rural areas.

2. The catchment area: theoretical presentation

(a) *A priori*, the catchment area of a school to be reached on foot is a circle whose radius is the maximum distance from home to school. The number of children for schooling may be calculated by means of the formula:

$$E = \pi r^2 d$$

where d is school-age population density and r is the radius of the circle, i.e. the maximum distance children can travel.[1]

---

[1] The area of a circle with radius r is equal to πr^2.

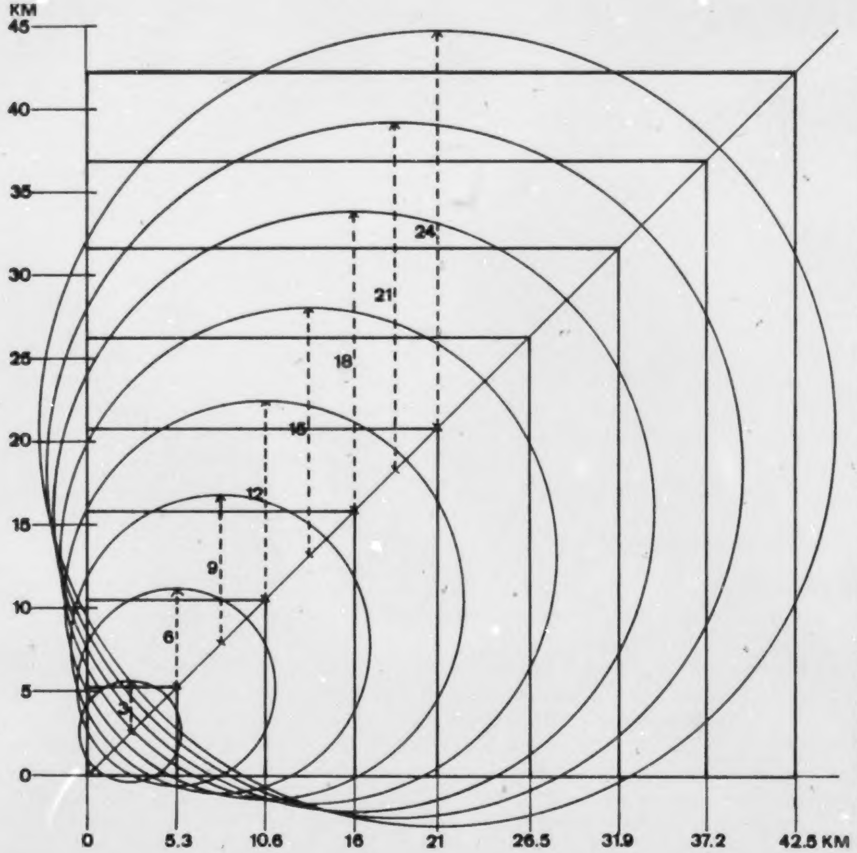

KM
45
40
35
30
25
20
15
10
5
0
3
6
9
12
15
18
21
24
0
5.3
10.6
16
21
26.5
31.9
37.2
42.5 KM

FIGURE 7. *Spatial representation of catchment areas*

TABLE 11. *Calculation of catchment areas*

Radius in km r	Area in km² $x^2(\pi r^2)$	Square root of area x
3	28.3	5.3
6	113.1	10.6
9	254.7	16.0
12	452.6	21.0
15	707.1	26.5
18	1 018.3	31.9
21	1 386.0	37.2
24	1 810.3	42.5

Catchment area $= \pi r^2 = x^2$
$x = \sqrt{\pi r^2}$

When the school map for County Sligo in Ireland was being elaborated it was suggested that a slide rule be used to estimate the theoretical catchment area of a school in the light of the distance to be covered, and population density. Figure 7 and Table 11, both taken from that study, show the manner of estimating catchment areas in the light of population density and distance. For example, with a maximum distance of 3 kms. to be covered, the catchment area will be 28.3 sq. km.; if the density of school-age population is 3 inhabitants per square kilometre the school's enrolment will be a maximum of 85 pupils.

(b) However, circular catchment areas have one major disadvantage. For any network of schools there are two possible alternatives, as Figure 8 shows. The result is either that some areas fall outside any catchment diagram, or that some areas belong to more than one catchment scheme. This is why it is theoretically more satisfactory to have catchment areas in the shape of hexagonal cells, as illustrated in Figure 9. In this case, the following equation gives the numbers for enrolment:[1]

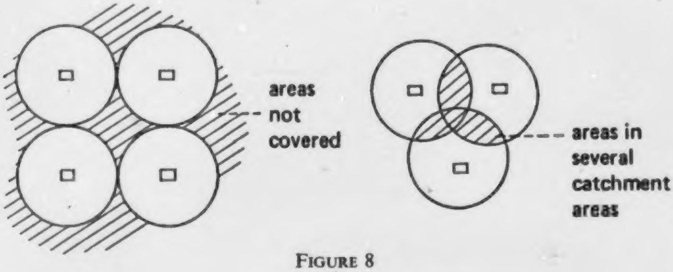


FIGURE 8

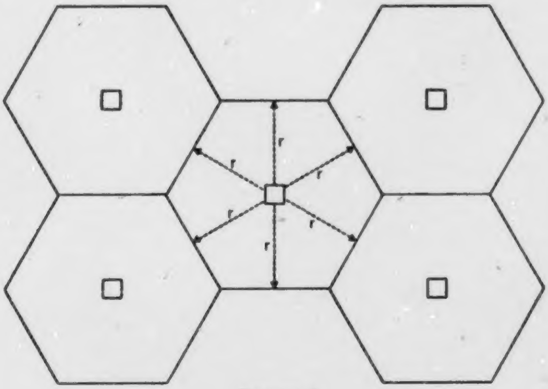


FIGURE 9

$$E = 2.598r^2 \times d.$$

---

[1] The expression $2.598r^2$ gives the area of an hexagonal cell.

Taking three kilometres as the maximum distance to be covered on foot by a child in primary school, a school's enrolment will vary as the result of changes in the density of schoolchild population in the manner indicated below.

Density of schoolchildren/sq. km.	1	2	3	4	5	10	15	20	25
Numbers of children for schooling	24	48	72	93	117	234	351	480	585

With a table of this kind it is possible to determine school premises requirements in the light either of their size or of population density. For instance, if density is one child per sq. km., one school (with one teacher) of 24 pupils is acceptable; if the minimum size of a school is to be 75 pupils, then only those areas with a population density exceeding three pupils per sq. km. can expect to have primary schools, and so on.

(c) On the other hand, it must be admitted that what has been said above concerning catchment areas is theoretical, since it presupposes:

(a) homogeneous population distribution;

(b) equal possibilities of getting to school from *all* places included in the catchment area;

(c) schools with identical characteristics, such as size, standards, regulations on admissions, etc.

In practice, things do not work out this way; the places where people live are often strung out along existing roads rather than uniformly dispersed over the geographical area in question. It is rare indeed to find a district without changes in physical relief.

Moreover, the actual possibilities of getting to school vary and, in spite of the efforts made by central education authorities to remove inequalities, schools continue to differ when you look at them in the light of certain criteria. The conclusion, therefore, is that what has been said on catchment areas from a theoretical point of view is not of practical value when it comes to actually finding solutions for school-map problems in a particular area.

As against this, however, what has been said will prove to be of assistance when overall and nation-wide estimates are needed of requirements in the matter of premises and physical facilities. The following numerical example provides an illustration of the method followed.

(d) *An example of the manner of applying the theoretical approach.* Suppose that, after the catchment areas of existing schools in the base-year of the Plan have been decided on, it proves possible to identify ten areas not so covered. Let these areas be called $z^1, z^2, \ldots z^{10}$: the population densities of the areas $d^1, d^2, \ldots d^{10}$; the maximum permissible distances from home to school $r^1, r^2, \ldots r^{10}$, taking account of the physical relief of the areas and the means of communication available; and the numbers eligible for schooling $e^1, e^2, \ldots e^{10}$.[1] The requirements in the way of schools(n^1) will be given by the following equations:

$$n = n^1 \qquad n^1 = \frac{s^1}{b^1} \qquad b^1 = 2.598\, r^{1\,2}$$

Table 12 illustrates the calculations made.

---

[1] $e^1 = s^1 d^1$.

TABLE 12. Manner of applying the theoretical approach

Zones	Density pupils/km^2 (d^1)	Distance (km) (r^1)	Surface km^2 (s^1)	Catchment area (b^1)	Enrolment (e^1)	Number of schools (n^1)
Z1	1	4	200	41.6	200	5
Z2	1.5	4	50	41.6	75	2
Z3	2	3	45	23.4	90	2
Z4	2	2	45	10.4	90	5
Z5	3.5	2.5	30	16.2	105	2
Z6	5	2	30	10.4	150	3
Z7	5	2	60	10.4	300	6
Z8	6	2.5	20	16.2	120	2
Z9	5	2	15	10.4	75	2
Z10	5	1.5	13	5.8	65	3
Total	—	—	—	—	1 270	32

3. *The findings resulting from case studies*

In practice, there are a number of factors which influence the regularity of shape of catchment areas, and in examining requirements in the matter of premises and drawing up the school map one should not be satisfied with theoretical estimates such as the preceding.

(*a*) *The 'regulations' factor*

The maps which follow, taken from the reports on Ireland and Uganda, show that catchment areas are not only very irregular in shape, but lack clear-cut boundaries; the fact is that most countries do not have strict rules pertaining to the school children should attend as the result of where they live. If the schoolchild can go to whichever school he wants to and not to the school officially provided in the area he lives in, then the concept of catchment-area loses most of its meaning.

(*b*) *Infrastructure*

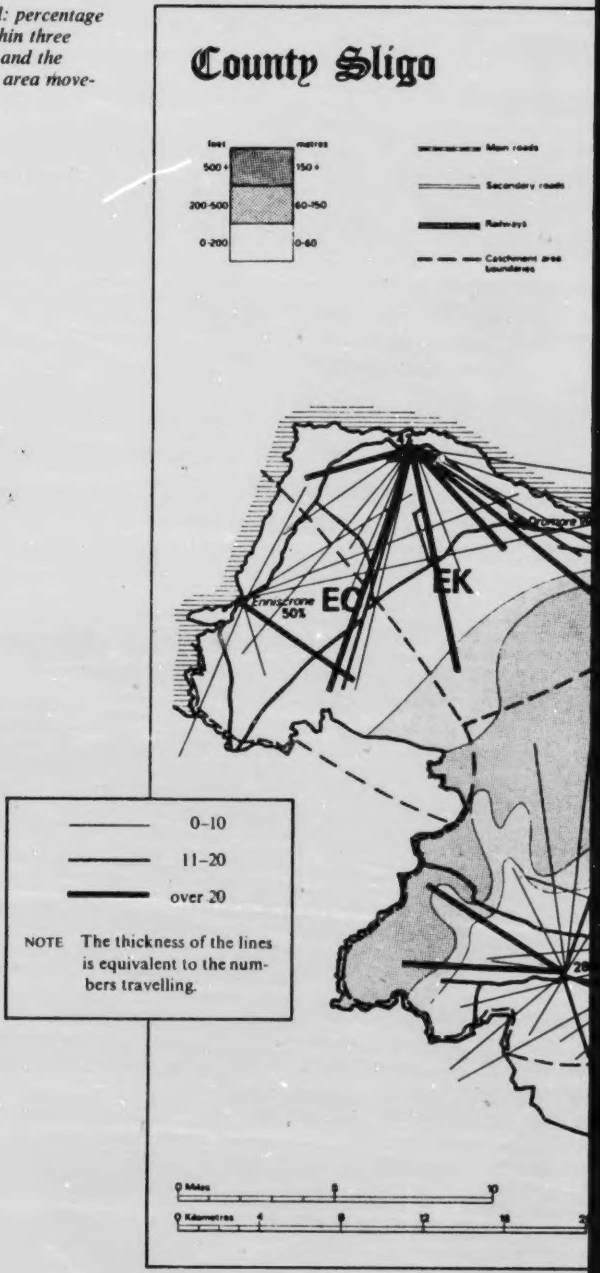
Irregularly-shaped catchment areas also result from the uneven distribution of dwelling-places and the characteristics of the existing road network; the example of the Aurich area in Lower Saxony is particularly typical in this connection. If a comparison is made of the map showing the road network and inhabited localities with the map of *Hauptschule* catchment areas, a striking similarity will be seen between the shapes of catchment areas and the shape of grouped inhabited places.

(*c*) *The administrative factor*

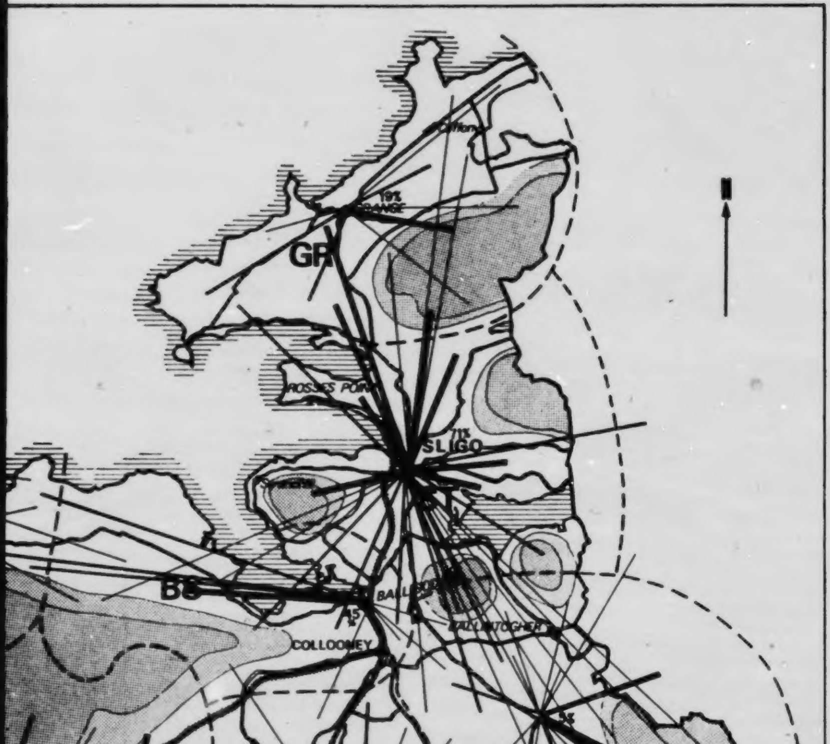
One has to recognize, also, that the boundaries of catchment areas cannot but be affected by the boundaries of existing areas for other administrative purposes, such as commune, *arrondissement* and canton, postal and health-service sectors, and agricultural improvement areas, etc. Of course, nothing requires that schools' catchment areas coincide exactly with the service areas of other official authorities, such as the post-office, hospital and clinic services, the market etc., but the shape of a catchment area will be conditioned by the shapes of regional development districts decided on by the authorities in charge of national development. Where

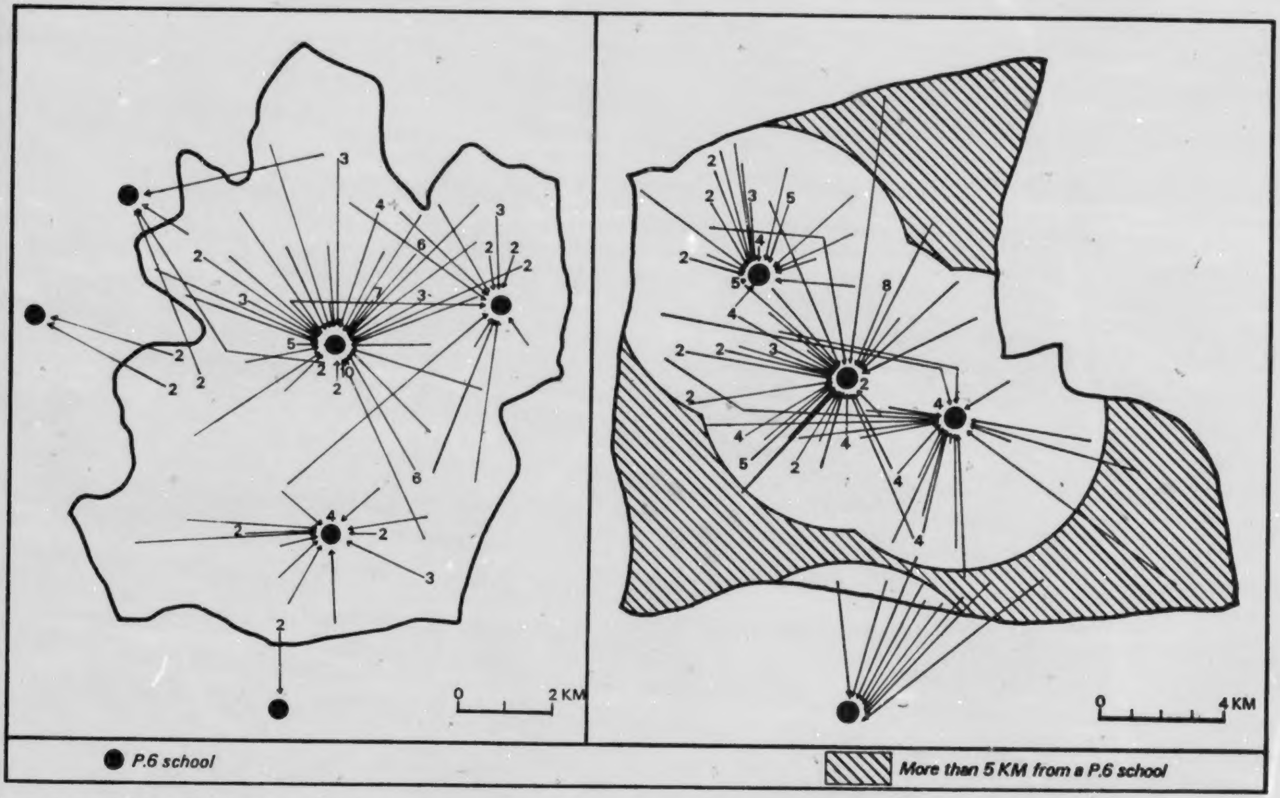
[*Text continued on p. 159*

Map 18. *County Sligo, Ireland: percentage of pupils who live within three miles of their school, and the main inter-catchment area movements, 1971.*

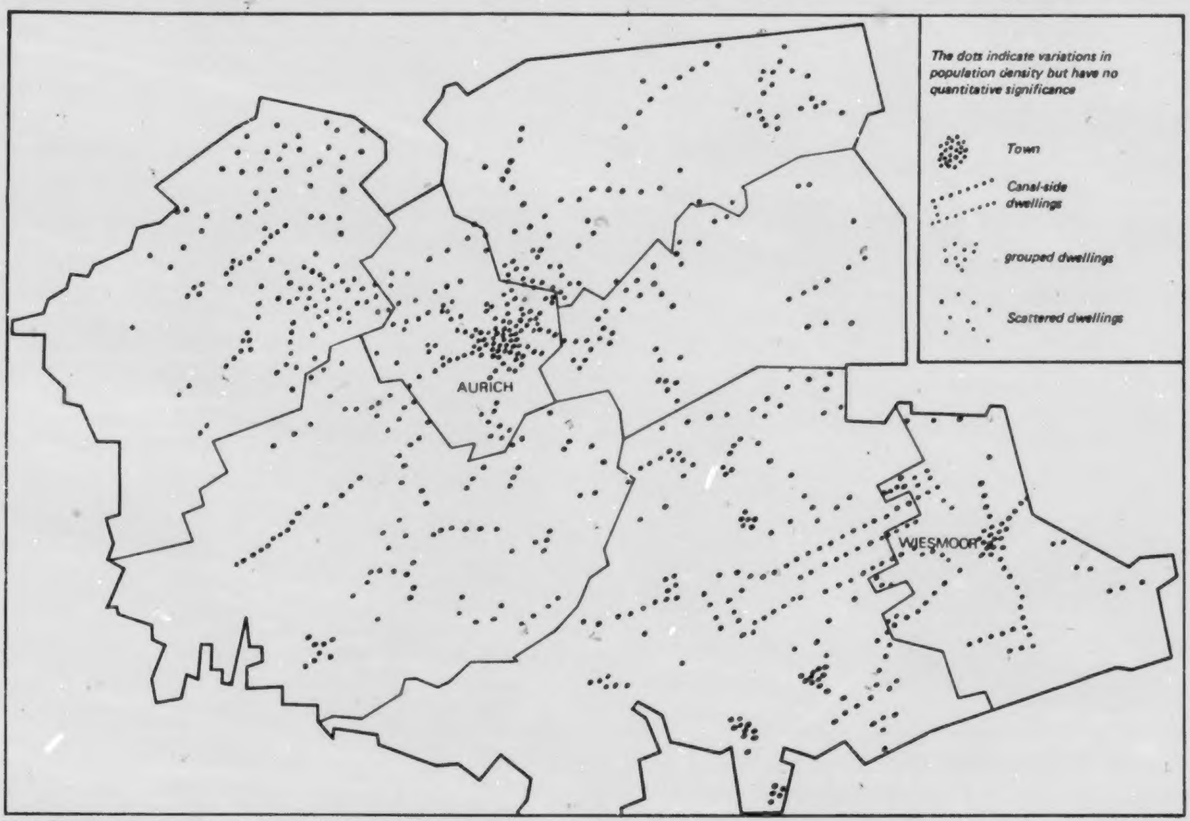

County Sligo
feet
metres
500+
150+
200-500
60-150
0-200
0-60
Main roads
Secondary roads
Railways
Catchment area boundaries
Enniscrone
50%
EC
EK
0–10
11–20
over 20
0 Miles
5
10
0 Kilometres
4
8
12
16

NOTE The thickness of the lines is equivalent to the numbers travelling.

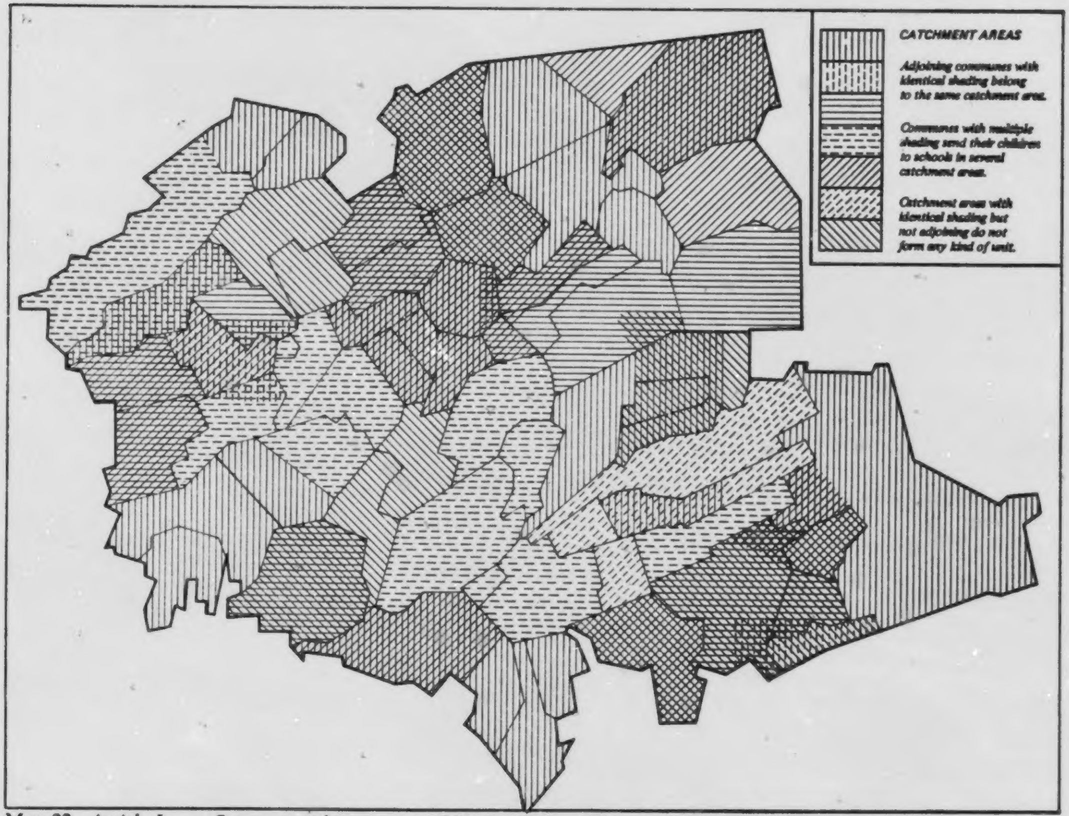

N
Cliffoney
19%
GRANGE
GR
ROSSES POINT
71%
SLIGO
BS
BALLISODARE
15%
BALLINTOGHER
COLLOONEY
5%
RIVERSTOWN
CL
Ballynacarrow
TC
BALLYMOTE
25%
BM
TUBBERCURRY
40%
Bunninadden
GT
Gorteen
26%


0
2 KM
0
4 KM
P.6 school
More than 5 KM from a P.6 school

MAPS 19 and 20. *Ankole District, Uganda: catchment areas for P.6 pupils in Kyeizooba and Rubindi gombororas.*


The dots indicate variations in population density but have no quantitative significance
Town
Canal-side dwellings
grouped dwellings
Scattered dwellings
AURICH
WIESMOOR

MAP 21. *Aurich, Lower Saxony: population distribution 1970.*


CATCHMENT AREAS
Adjoining communes with identical shading belong to the same catchment area.
Communes with multiple shading send their children to schools in several catchment areas.
Catchment areas with identical shading but not adjoining do not form any kind of unit.

MAP 22. *Aurich, Lower Saxony: catchment areas of Hauptschulen, 1970.*

schools are located in 'central localities', as proposed by the reports on Lower Saxony (Germany), on Gharb (Morocco), and on the Chahroud *chahrestan* (Iran), school-catchment area centres of gravity will coincide with the development poles and this will promote coincidence between catchment areas and service areas.

(*d*) *Time taken from home to school*

It is important to bear in mind that the shape and size of catchment areas depend on the means of getting from home to school, since in practice the variable which decides how large a catchment area may be *is not the distance children have to travel but the time they take doing it.* In fact, our reports show that the maximum distance to be covered varies from country to country; for instance, for a primary-school child in San Ramón, Costa Rica, it is 3.5 kms.; 2 kms. in Kalpouche (Iran), and 2 miles in Ireland. As against this, the maximum acceptable time taken in getting to school seems to be in the neighbourhood of 45 minutes for primary-school children in any country. Thus, the shape and extent of the catchment area is decided not by the maximum distance to be covered, but by:

(i) the maximum time spent on getting from home to school;
(ii) the means of transport used (and its speed).

Figure 10 illustrates how the shape of a catchment area is determined by the time taken from home to school.

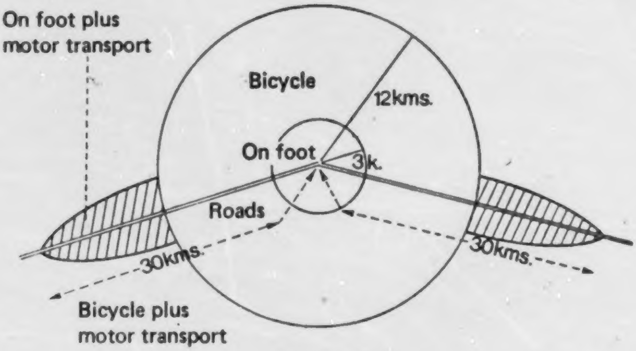
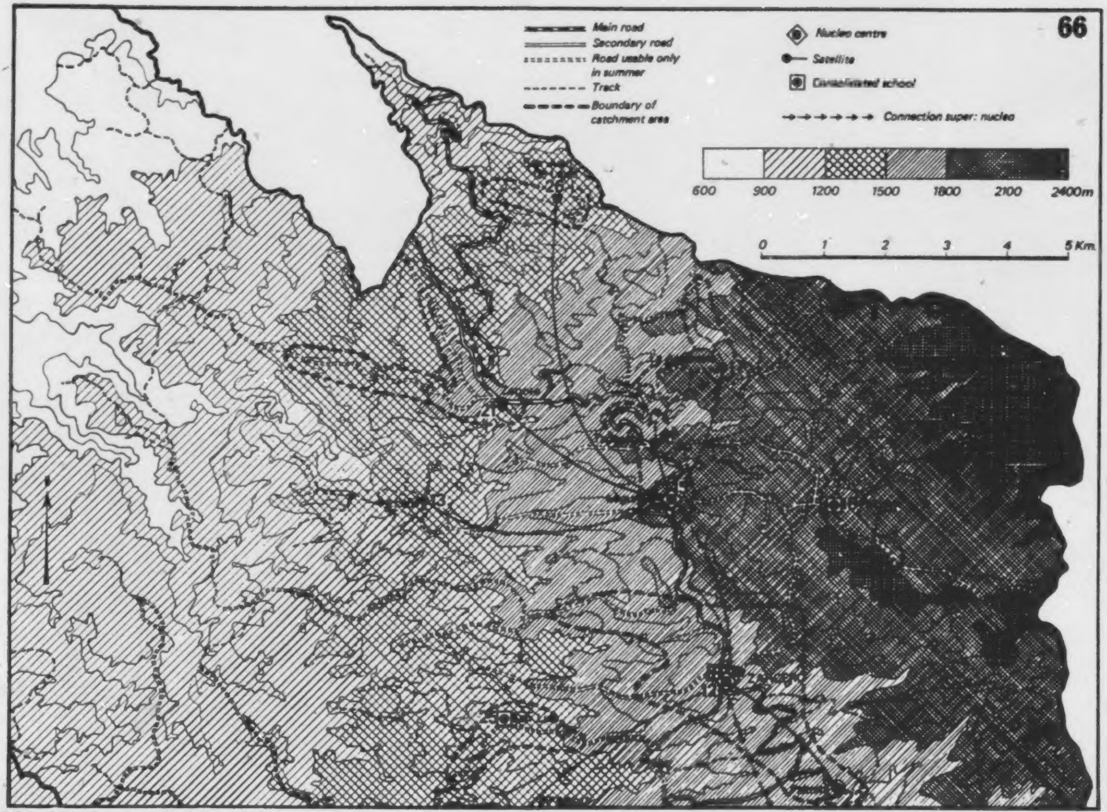


FIGURE 10.

If we take 40 minutes as the maximum acceptable time from home to school, and speed on foot as 4.5 km. an hour, that on a bicycle as 18 km. an hour and that by motor-transport as 45 km. per hour, then we obtain a catchment circle with a radius of 3 km. for children going to school on foot, one with a radius of 12 kms. for those using a bicycle, two axes 30 kms. long along the roads, and two catchment areas for children enjoying motor-transport but taking a certain amount of time to get to the pick-up point.

If, on top of this, the area is a hilly one, the shape of the catchment area will be still more complex and irregular. As Map 23 of one of the San Ramón areas shows, catchment areas develop along the roads, influenced by the features of physical relief and by means of communication.


66
Main road
Secondary road
Road usable only in summer
Track
Boundary of catchment area
Nucleo centre
Satellite
Consolidated school
Connection super: nucleo
600
900
1200
1500
1800
2100
2400m
0
1
2
3
4
5 Km.

Map 23. *San Ramón, Costa Rica: catchment areas in Zarcero.*

(*e*) *The political factor*

The significance of catchment areas varies according to the planning system in force and the goals associated with the school map.

(i) Drawing the boundaries of catchment areas is meaningless unless there are school attendance rules framed in the light of where children live;

(ii) Boundaries will be drawn in relation to economic criteria, such as that of reducing transport costs as much as possible, if what is aimed at in connection with a rational school map is the keeping of costs down to a minimum level. The case will be completely different if the aim in connection with the school map is to use the school as a means of mixing the various social classes to which children belong. In some countries, where various ethnic groups speak different languages, account has to be taken of the geographical distribution of the races concerned, with a view either to promoting a mixing of social categories or in order to overcome the difficulties of providing the same level of education for children who do not all speak the same language. This problem has been particularly acute in Sri Lanka; here, in addition to the habitual separation of schoolchildren in terms of the creed they belong to (Buddhist, Mohammedan or Christian), there is a division in terms of the language spoken (Sinhalese, Tamil or English), and all of these factors had to be taken into account when the reform for the unification of the education system was being introduced.

In actual practice, a distinction has to be made between levels of education in the various areas and the extent to which those areas have become urbanized.

(*i*) *Compulsory schooling.* In low-population rural areas there is little possibility of schooling along traditional lines, and the catchment-area concept does not apply.

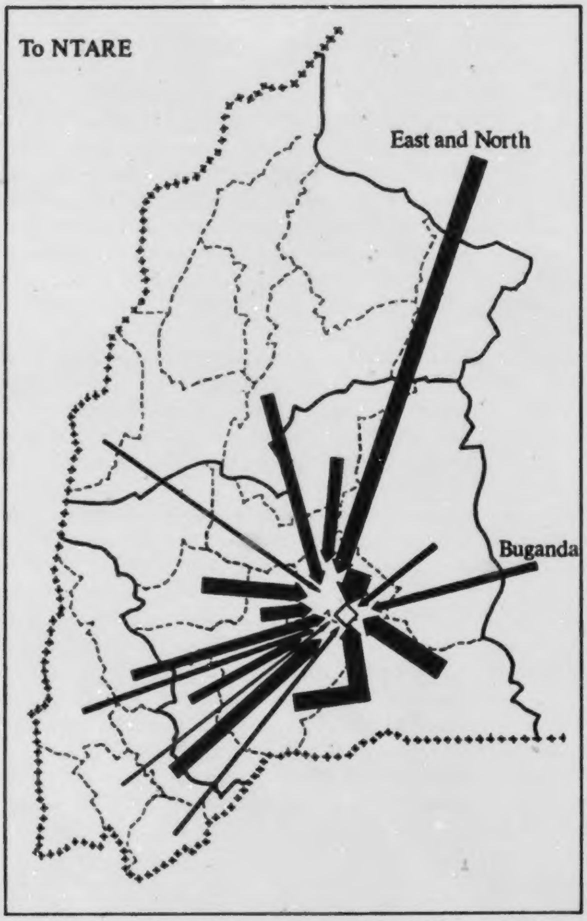
Where country districts have a population density sufficient to justify the opening of minimum-size schools, catchment areas can be drawn by taking into account the means of communication, the maximum time permissible from home to school, and the distribution of inhabited places.

In urbanized areas, where the opening of large schools is feasible, there are two possibilities; the first aims at keeping costs down to a minimum, and the other at providing the greatest measure of mixing of social classes in schools. The two systems are not necessarily compatible and, where they are not, it is policy that opts for one or the other.

(*ii*) *Beyond compulsory education.* If admission to schools is made to depend on school results two extreme situations may result:

The case of Uganda: in theory, any child who has successfully completed his primary education may ask to be admitted to secondary school; the fact that almost all secondary schools have boarding establishments causes the catchment-area concept to lose a great deal of its meaning. As is shown by Map 24, the Ntare school takes in children from the county, from the Ankole district, from the neighbouring districts of Toro and Kigeri, and also from the other regions of the country, from Buganda and the eastern and northern regions.

The case of Morocco: all children who have completed their primary schooling are divided according to sex and school of origin among a number of *lycées* and colleges where they undergo an observation cycle. After three further school years they are guided in function of the school of origin and sex into arts, technical or science sections as boarders or day-pupils. At the end of the fourth school year a further guidance operation takes place, the children then proceeding, according to

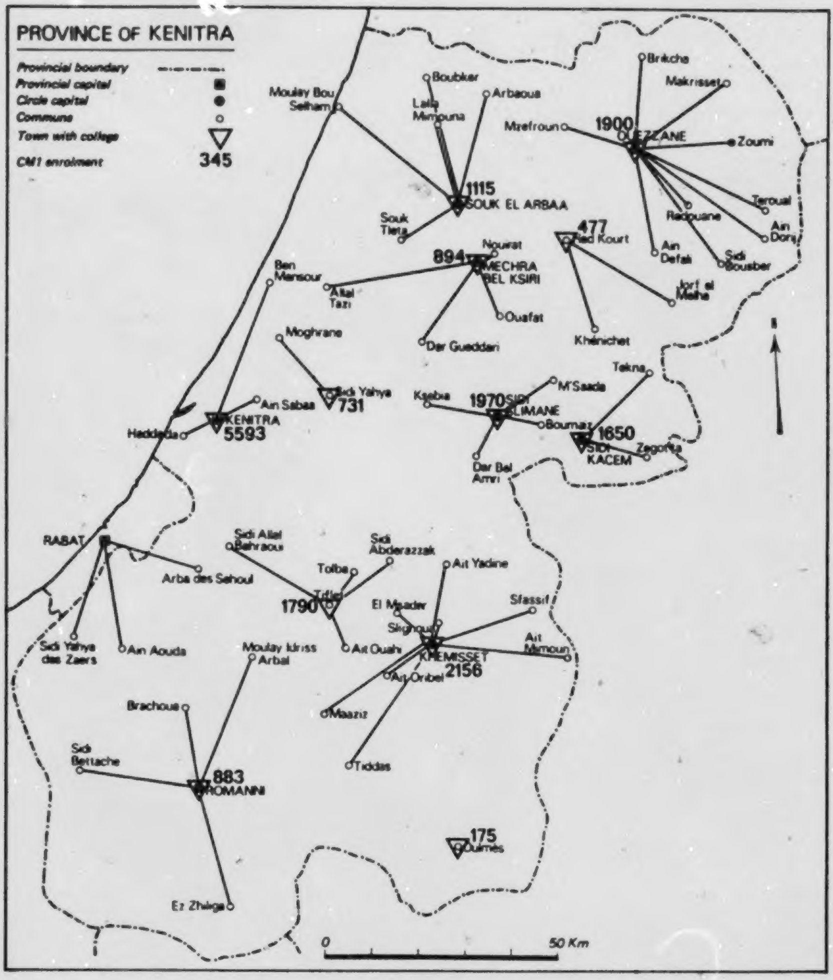


MAP 24. *Ankole District, Uganda: movement of S.1 pupils to Ntare.*

number of school places and sectors available in the area's second-cycle school, to classical or to modern Arab literature, experimental science, mathematical science, economic science or engineering. Maps 25 and 26 show the first- and second-cycle catchment areas in the Province of Kénitra.

(*f*) *Private schools*

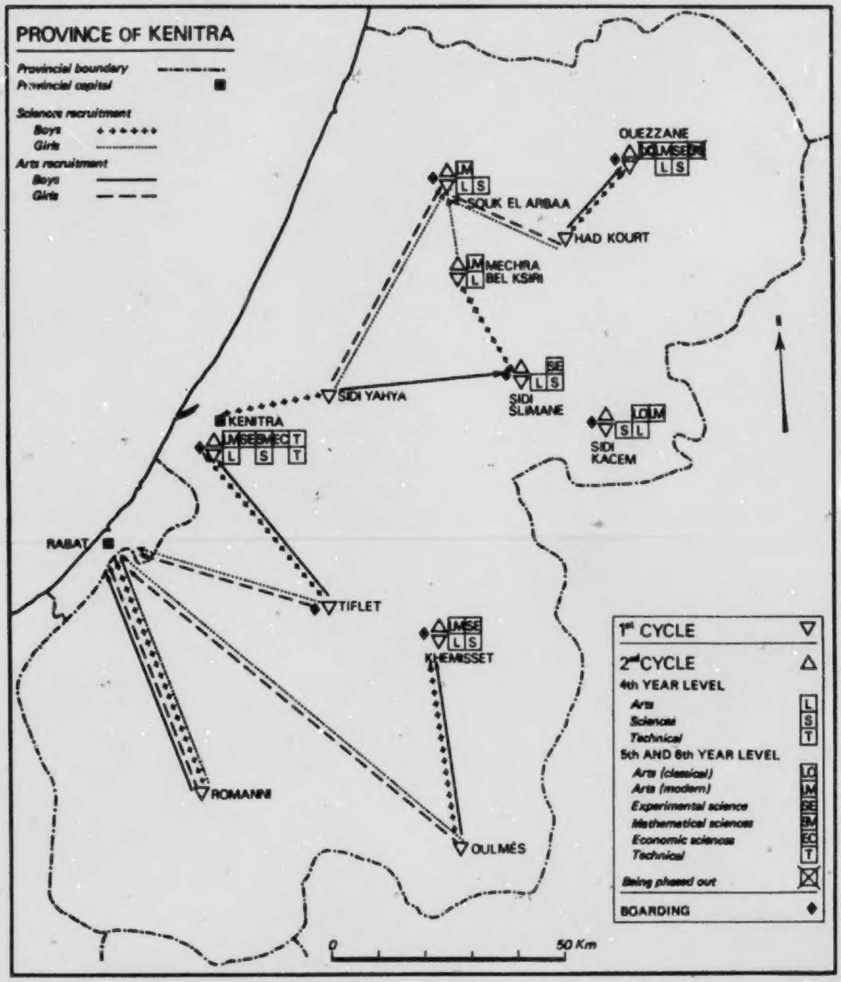
Drawing the boundaries of catchment areas is complicated by the existence in some countries of a network of private schools which do not follow the same rules on admission as prevail in the State sector; what with transfers of children from one system to another, and with little or no control exercised over the private sector, the catchment-area concept is deprived of all meaning in the case of the


PROVINCE OF KENITRA
Provincial boundary
Provincial capital
Circle capital
Commune
Town with college
CM1 enrolment
345
Brikcha
Makrisset
Mzefroun
1900
OUEZZANE
Zoumi
Teroual
Ain Dorij
Redouane
Sidi Bousber
Ain Defali
Jorf el Melha
Boubker
Arbaoua
Lalla Mimouna
Moulay Bou Selham
1115
SOUK EL ARBAA
Souk Tleta
477
Had Kourt
Nouirat
894
MECHRA BEL KSIRI
Ben Mansour
Allal Tazi
Ouafat
Dar Gueddari
Khénichet
Moghrane
Sidi Yahya
731
Ain Sebaa
KENITRA
5593
Haddada
Tekna
M'Saada
Kssebia
1970
SIDI SLIMANE
Boumaiz
1650
SIDI KACEM
Zegotta
Dar Bel Amri
RABAT
Arba des Sehoul
Sidi Yahya des Zaers
Ain Aouda
Sidi Allal Bahraoui
Sidi Abderazzak
Tolba
Tiflet
1790
Ait Yadine
El Mesader
Sfassif
Sidi Ghouzi
Ait Ouahi
Ait Mimoun
KHEMISSET
2156
Ait Oribel
Maaziz
Tiddas
Moulay Idriss Arbal
Brachoua
Sidi Bettache
883
ROMANNI
Ez Zhiliga
175
Oulmes
0
50 Km

MAP 25. *Kénitra, Morocco: first-cycle catchment areas.*

private schools and, in the case of the State schools, the boundaries of the catchment areas become less clear-cut. Specific investigations have to be made of the way in which private schools recruit pupils, so that account can be taken of this factor in attempting to establish the density of schoolchild population in the State sector—all the more so since this information is indispensable when it comes to drawing catchment area boundaries.

When the school map of Zahlé in Lebanon was under study, it was agreed that a certain proportion of the population of school age, uniformly spread over the


PROVINCE OF KENITRA
Provincial boundary
Provincial capital
Science recruitment
Boys
Girls
Arts recruitment
Boys
Girls
OUEZZANE
SOUK EL ARBAA
HAD KOURT
MECHRA BEL KSIRI
SIDI YAHYA
SIDI SLIMANE
SIDI KACEM
KENITRA
RABAT
TIFLET
KHEMISSET
ROMANNI
OULMÈS
1st CYCLE
2nd CYCLE
4th YEAR LEVEL
Arts
Sciences
Technical
5th AND 6th YEAR LEVEL
Arts (classical)
Arts (modern)
Experimental science
Mathematical sciences
Economic sciences
Technical
Being phased out
BOARDING
0
50 Km

MAP 26. *Kénitra, Morocco: second-cycle catchment areas.*

area, would attend private schools, the proportion being 10 per cent for primary schooling and 25 per cent for middle schools. The boundaries of State schools' catchment areas were drawn for 90 per cent of children attending primary school and 75 per cent of children eligible for schooling in middle schools. In short, what was being done was to correct the estimated size of catchment areas by taking account of children of school age being absorbed by the private sector. It is to be noted that such adjustments, which are sometimes unavoidable, are neither satisfactory nor conducive to precise boundary-drawing of State schools' catchment areas. As soon as the private sector is of more than negligible size, that is to say, if the number of children it takes in rises above 10 per cent of the total of those eligible for schooling, any rationalization of the school network presupposes a minimum of co-ordination of what is being done by the State and private systems and, of course, a strict control of the private education system.

(*g*) *The social factors*

Other corrections of the same kind have to be made to take account, for instance, of schooling facilities provided for mentally or physically handicapped children; it is generally assumed that such children will be provided with education in specialized schools or specialized classes in the ordinary schools.[1] In the report on the Aurich district of Germany the numbers of those due for primary schooling were corrected on the understanding that handicapped children account, on average, for about 8 per cent of the age-group in question.

(*h*) *The pedagogic factors*

Finally, the exact boundaries of catchment areas are directly influenced by school size standards at each level; in the country districts it is minimum size which, together with population density, decides what the catchment area is, while in urban areas it is the maximum size which decides what the catchment area will be. This fundamental consideration will therefore be examined in the following section.

B. Standardization of premises and physical facilities

Any standardization involves the definition of minimum, maximum and optimum size for schools. Obviously, these three standards are influenced by a number of factors depending on whether primary or post-primary schools[2] are being considered. To begin with, however, we shall make a few reflections of a theoretical nature, with illustrations drawn from actual results recorded in our reports; after which we shall go on to put forward a number of methodological proposals for use by those in charge of drawing up the school map.

1. Theoretical considerations

(*a*) *Primary schools*

(*i*) *Minimum size.* Granted that the main aim is to utilize premises and physical facilities as intensively as possible, it is clear that the minimum size for a school depends primarily on the 'pedagogic facts of life' in the education system under consideration. These 'facts of life', in more detail, are the following:

(a) A number of classes or years of schooling at the primary level; this can range from three years in the new school system in Nepal, to eight at the time the Sri Lanka school map was organized.

(b) Pupil/teacher ratio; this also varies very widely from area to area and country to country; it is not exceptional to run across a rate as low as ten in certain schools

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[1] This method of dealing with the handicapped has met with severe criticism from a number of specialists. We refrain from taking sides in a matter outstripping our competence and the field of school-map methodology.

[2] i.e., middle or secondary with a number of optional courses.

in Costa Rica, Iran and Morocco, or as high as 100 in certain schools in Uganda.
(c) The maximum number of courses per classroom; this obtains especially in country districts of very scattered population where one-class schools are to be found, as in Costa Rica, Germany, Iran, Ireland, Morocco, Nepal, Uganda, and in urban areas of high population-concentration, where the same classroom is used part of the time by one set of pupils and part of the time by another, as in Tunisia and Ethiopia.
(d) The number of teaching periods or hours per day; this influences flexibility of utilization of premises and physical facilities. In Costa Rica it is seven hours for schools with a shift-system and four hours for simple-timetable schools.

As a result, the minimum capacity of schools cannot be arrived at except by referring to education aims and programmes on the one hand, and on the other to teaching methods, e.g. the maximum number of children per class and of classes per classroom or teacher.

In theory, it may be said that the minimum size for a school is that of a one-class school. Where this is the case, if one grants, for instance, that the pupil/teacher ratio should not be lower than 15, the minimum size is 15, as in Iran, in its Literacy Corps Schools. If the school is to be attended by two or three sets of pupils, i.e. with double- or treble-shift teaching, then the number enjoying schooling will be two or three times the minimum pupil/teacher rate.

This minimum is far from being regarded as acceptable by all educationalists and teachers; some of them argue that a teacher cannot simultaneously look after sets of children belonging to a number of classes. Others believe that the maximum number of courses that a teacher can look after at the same time must not be higher than four, which means that in a six-year primary-school system the minimum size of school has to be one of two classes.

Depending on the degree of importance one wishes to accord to pedagogic factors, a school's minimum size may vary from one class only to the number of classes equal to the number of years' duration of primary schooling.

In this connection, no matter how satisfactory the pedagogic imperative may be, it may lead to acceptance of minimum-size schools which are neither economically nor administratively viable. Suppose, for instance, that the geographical distribution of population is such that it is hardly possible to recruit the minimum number of pupils without providing boarding facilities for the majority of them. Where this is so, the cost per pupil becomes prohibitive and the provision of education in the country can be adversely affected as a result. With a view to eliminating these disadvantages a number of different systems have been devised, many of which merit mention.

In the Ivory Coast pupils are successively lodged by different families of those in the school, which makes it possible to avoid the setting-up of boarding establishments which would be both highly expensive and undesirable for very young children normally attending primary schools.

In Iran there is a proposal for five different systems, namely:

(a) isolated schools with enrolments higher than the required minimum (25);
(b) isolated schools run by the Literacy Corps with possibly less than 25 pupils, down in fact to 15; teachers are supposed to take part in other activities, and principally the adult literacy campaign; this makes small schools economically viable;

(c) satellite villages with no schools, children travelling to other villages on foot, or by a school-transport system: all of those phenomena make it possible to increase the school enrolment in the neighbouring villages;
(d) satellite schools with courses for only the first three years of primary schooling;
(e) central schools taking in children from the satellite schools and the satellite villages.

A conclusion of the report on the Chahroud area is that education supply organized along these lines cannot cover all villages and that it will be necessary to provide for population amalgamation in the case of all villages with less than 50 inhabitants.

In Morocco irregular two- or three-yearly recruitment of pupils takes place, with the aim of ensuring less dispersal of the teacher's efforts by presenting him with the same number of pupils each year.

In Costa Rica the system of nuclearization has been taken up; details of this system will be given in the section on secondary education.

(*ii*) *An optimum size, or standard?* It is by no means easy to decide on an optimum size for primary schools. What is optimum for the pedagogue is not necessarily optimum for the economist. Theoretically, however, it is possible for each level of unit costs to have a corresponding optimum size from a pedagogical point of view. Actually, none of the studies available is of much assistance in determining the optimum enrolment for a primary school.

As against this, reference may be made to the concept of standard size as determined by a breakdown of schools by size.[1] Table 13 sums up the situation in a number of selected countries. It would appear that, with the exception of Dabakala, standard size is about 50 pupils and that, in most cases, we have to do with one- or two-teacher schools.

TABLE 13. Breakdown of primary schools by size (number of pupils)

Area	Enrolments: 0–25	26–50	51–75	76–100	101–150	151–200	201 & +	Total
Chahroud (Iran)	16	37	27	16	17	8	25	146
Kaski (Nepal)	3	43	44	30	23	9	8	160
Aurich (Germany)[1]	10	20	15	9	2	3	4	63
Sligo (Ireland)	30[2]	25[2]	21	11	14	1	5	107
San Ramon (Costa Rica)	26		30		25		20	101
Dabakala (Ivory Coast)	1	1	2	6	3	0	3	16

[1] 0–30; 30–60; 60–90; 90–120; 120–150; 150–200; 201 and +.
[2] 0–35; 36–50.

(*iii*) *Maximum size.* Whereas in regions with low population density the big difficulty is to settle on the minimum size of schools, in areas with high population density one encounters the opposite problem—that of the maximum size for schools. Here, priority of consideration has to be given to pedagogic and administrative criteria. A school that exceeds a certain size becomes very difficult to manage: large schools having, for instance, more than 1,000 pupils eliminate the possibility of an essential contact between headmaster, teachers and pupils. Other factors, such as noise and pupils' attitudes, also contribute to restricting school size. But it is difficult to establish with any accuracy a size standard not to be exceeded, and uniform for all countries.

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[1] The breakdown is in terms of maximum frequentation.

For the purpose of guidance, however, a school should have not more than three sets of pupils per year of schooling; in other words, with a six-year primary-schooling system, maximum school size would be 3 × 6 = 18 sets of pupils, which means, with a pupil/teacher ratio of 50, an enrolment of 900.

An examination of statistics for the countries studied gives the following maxima:

in the town of Sligo (six years)	585
in the town of San Ramón (six years)	1,518 (double shift)
in the town of Zahlé (five years)	400
in the town of Aurich (four years)	316
in the great built-up area of Casablanca (five years)	3,535 in one part of the city and 3,650 in the other.

It would therefore appear that, leaving aside the large metropolitan centres such as Casablanca, small towns of 15,000 to 50,000 inhabitants usually have schools with two to three sections per class. General conclusions are clearly next to impossible and each country has to consider its own peculiar features in order to determine a maximum size which should not be exceeded in the case of primary schools.[1]

(*b*) *Secondary schools*

The difficulties encountered in fixing size standards for primary schools are met again when it comes to secondary schools. In addition, however, there are other difficulties stemming from the nature of the services provided in second-level education and from the fact that secondary education has not reached the same level of development as primary education.

On the one hand, providing education for a smaller section of an age group in the secondary-education system means, everything else being equal, a lower density of pupil population, and a more extensive catchment area for equal size. This leads either to the setting-up of very small schools or to the acknowledgement that it is virtually impossible to draw a second-level school map without calling on school transport systems and boarding establishments. The second possibility is widely acknowledged, and it makes large schools feasible. According to Castaldi,[2] size standards accepted in the United States are 200 to 650 pupils in primary schools, 500 to 1,000 pupils in junior high schools, and 600 to 1,500 in high schools.

On the other hand, in most countries second-level education is of a very diversified nature, particularly in the second cycle. This being so, a number of categories of schools are possible, as follows:

1. first-cycle or middle schools;
2. second-cycle schools providing the whole range of subjects;
3. second-cycle schools providing only certain types of courses;

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[1] As an illustration, it may be noted that in Morocco the maximum size is 25 classes, with a limit of 30 being tolerated. It is a standard which is not always observed in practice.

[2] B. Castaldi, *Creative planning of educational facilities*, Chicago, Illinois, Rand McNally, 1969.

(4) schools of the complete secondary-education type with all, or part, of the range of second-level courses.

Obviously, minimum, optimum and maximum sizes will vary, in function of whether we are dealing with a school of type (1), (2), (3) or (4). Further standards for size and catchment area will be affected by whether a school is co-educational or not. Finally, depending on the educational aims by specializations approved of by the plan, a preference will be shown for one of the categories of school listed above.

In any case, standards will vary according as the emphasis is on the economic utilization of schools or on pedagogic requirements. Let us take an example:

(i) suppose the minimum size fixed on the basis of economic criteria is a school for 600 pupils; a school of this size requires administrative and service staffs which, without any extra expense, could look after a school for 1,200 pupils. This means that there has to be a reconsideration of the structure of the school.

(ii) if it is agreed that the rate of utilization of rooms and laboratories is satisfactory only if there are at least 2,400 pupils, it then becomes apparent that a doubling of the size of this standardized school will result in a reduction of the unit costs of using certain sets of equipment and facilities;

(iii) if, however, the geographical distribution of population is such that there is hardly any possibility of getting 2,400 pupils without providing boarding facilities for 1,200 of them, it then becomes necessary to compare the cost of various possible solutions in the light of services provided and thus come to a decision on the least expensive solution.

In short, thanks to a continuing process of approximations, it becomes possible to arrive at a system of standards for schools. Standards decided on for building and physical facilities in the case of each category of school should cover, in particular, the following points:

(a) forms of teaching—lessons, practical work, laboratory work, etc.;

(b) teaching programmes—in respect of each year of the first and second cycles, the number of teaching periods for each subject;

(c) ratio of pupils to those in charge and those teaching—in respect of teaching staff, and administrative and service personnel;

(d) usable floor-space per pupil—classrooms and floor-space for joint use;

(e) cost determinants—an examination of costs for each category of school has to be made with an eye, in particular, to size and the services provided.

As a result of taking these principles as a starting-point and, at the same time, in the hope of overcoming various constraints a number of countries have gone over to the nuclearization system. The Costa Rica national plan for educational development provides that 'small schools (with less than 180 pupils) shall so far as possible amalgamate to form a nucleo, becoming satellites of a near-by school of sufficient size; the school which is best placed in terms of classrooms, physical facilities and library will become the central school. At the head of each nucleo there will be a Director with the responsibility of co-ordinating the technical, administrative, cultural and social activity taking place in the sphere under his control. Such nucleos will make it possible for all pupils within them to enjoy the advantage of better material and physical facilities. They will also make it possible to make better use of teaching staffs and, in particular, of specialized teachers, and facilitate a simplification of the administrative structure'. After examining

TABLE 14. San Ramón, Costa Rica: types of nucleus

	Type 1 Nucleus	Type 2 Nucleus	Type 3 Nucleus	Type 4 Nucleus
Population density (inhabitants-km^2)	40	65	75	120
Cycle I & II enrolment (pupils)	350	560	840	1 050
Cycle III enrolment (pupils)	175	280	420	525
Utilization rates of facilities:				
General classrooms	75%	80%	80%	81%
Special classrooms	55%	50%	60%	83%
Number of classrooms for cycles I and II	6	10	14	17
For cycle III	6	9	13	15

the curricula of cycles I, II and III with a view to maximizing the usage rates of premises, physical facilities and teaching staff, the authors of the study carried out in the San Ramón area[1] propose that there should be a number of standards for size of nucleos to take account of population density and the rates of usage of premises (see Table 14). This attempt at standardization has not been adopted in connection with the work on drawing up the school map because of reasons associated with the falling-off of population and the consequences this has for the children due to be schooled in the country; the essential point when it came to setting up premises capable of absorbing cycle III enrolments was to take advantage of the availability of superfluous cycle I and II premises. None the less, the methodological standardization approach remains attractive for other countries which are obliged to cope with a need for increased educational facilities at both first and second levels.

2. *Methodological guidelines for arriving at norms for minimum and standard sizes*

This being so, two suggestions may be made concerning methods for arriving at size standards for various categories of schools. As we have already seen, the fixing of standards for maximum size is governed by pedagogic and administrative criteria which are still largely empirical. As a rule, standards for maximum size are mainly of use in large built-up areas and, even there, they are seldom adhered to in practice, since everything depends on the land available. Because of this, the methodological guidelines that follow refer only to the fixing of norms for minimum and standard sizes.

(*a*) *Primary education*

(1) At this level, a minimum size standard is of practical use only in rural districts. As a preliminary step, let us make a calculation of the enrolment of a catchment area, taking into account minimum population density, the maximum time from home to school and the age-group due for primary schooling:

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[1] J. Hallak *et al.*, op. cit. (Costa Rica study).

Statistical facts

Population density	10 inhabitants per sq. km.
Time from home to school (no school transport)	45 minutes, equivalent to a 3 km radius
Catchment area	25 to 30 sq. kms.
Population	250 to 300
Primary-school age-group	(7%)

The result

Enrolment	17 to 21 pupils

The next thing is to compare the total cost of providing schooling in a 20-pupil school with the cost of providing schooling for 20 pupils with boarding facilities.

The diagram shows the successive stages in an iterative procedure designed to fix minimum size standards and taking into account the cost of providing schooling under various systems.

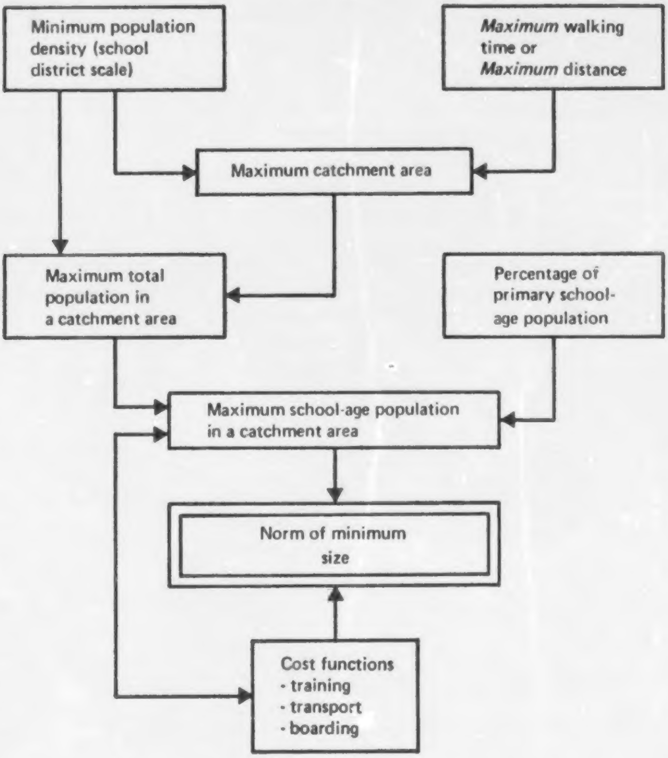
Minimum population density (school district scale)
Maximum walking time or *Maximum* distance
Maximum catchment area
Maximum total population in a catchment area
Percentage of primary school-age population
Maximum school-age population in a catchment area
Norm of minimum size
Cost functions
- training
- transport
- boarding

FIGURE 11. *Minimum size of primary schools.*

(2) Fixing a standard size can be particularly useful when it comes to drawing up the school map for new areas due for urbanization, or more generally, when a national development policy calling for the integration of various official services, such as schools, hospitals, etc., is about to be put into effect. The procedure shown in Figure 11 can also be used to calculate the norm of standard size; all that has to be done is to replace the terms 'maximum' and 'minimum' by the term 'average'.

In countries where pupils do not automatically go up from one class to another and there are high repeater rates, it is well to take into account the pupil/teacher ratio and the standard structure of a set of primary school pupils. The standard size norm will theoretically have to be a multiple of the numbers in a standard set of pupils; for instance this is the case if the standard pupil/teacher ratio is 40 and if, as a result of repeats and drop-outs, there is 'usually' a breakdown of enrolment between successive classes as shown below:

Class 1	*Class 2*	*Class 3*	*Class 4*
50%	30%	10%	10%

Finally, if the result of applying the above model is a standard school of 500 pupils, the breakdown as between successive classes will result in an unsatisfactory rate of use of teaching staffs, i.e. a pupil/teacher ratio of 33.[1]

Obviously, it will be better to decide on a 400-pupil norm for standard size as this will give an average ratio of one teacher for 40 pupils.

(*b*) *Middle and secondary education*

(*i*) *Its length and rates of use.* At the middle education stage, the school system frequently branches out into a number of sections of a general, technical, vocational or other nature. School premises become more diversified than for the primary school because of the various purposes they have to serve, e.g. classrooms, laboratories, workshops for manual work, rooms for various purposes etc. Furthermore, instead of one teacher responsible for first-level pupils for 90 per cent to 100 per cent of their time, we find a number of categories of specialized teachers in charge of general education and the optional courses. The result is that the minimum size of a middle or/and secondary school is largely governed by 'the economically viable pedagogic structure' guaranteeing 'minimum use' of premises and teaching staff.

In practice, the minimum size standard depends on what is acknowledged to be 'economically viable' or on the rate of 'minimum use'; in this connection a distinction has to be made between the two concepts of (a) length of time used, and (b) the rate of use.

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[1] Breakdown as between successive classes

	C1	*C2*	*C3*	*C4*
Pupils	250	150	50	50
Teachers	7	4	2	2

Obviously, for a given school the length of time used cannot be entirely divorced from the rate; for example, in countries such as Tunisia and Costa Rica, as soon as the volume of enrolment rises above a certain norm, 'doubling' of classes is resorted to, with a shift system. The result is that as soon as the rate of use reaches a figure which is considered to be the maximum, the length of time used is increased and this brings the rate down.

However, the length of time used depends on a number of other factors, including:

1. School time-tables, which can vary from 3–4 hours to 7 hours a day.
2. The annual school calendar—approximately 200 days, but varying widely (±30) from country to country.
3. Type of premises—some premises may be made available for non-school activities for longer, or shorter, periods.
4. The extent of out-of-school education activities—in a country such as New Zealand, we find premises being used systematically and intensively for adult training courses outside 'normal' school hours.

The rate of use is also influenced by factors other than the length of time used. As shown in Figures 12 and 13, the rate in the Friesland area of Germany varies according to the type of use, the length of time used and the nature of the premises. The same applies to teaching staffs. Some teachers will find it easy to work 'full-time' in one and the same school; others, who are more specialized, such as foreign-language teachers, will have to work part-time in a number of schools or fill in their working time with a job outside teaching, as in the case of teachers of physical training.

(*ii*) *Methods.* Consequently, before deciding on norms for minimum and standard sizes, it will be necessary:

(a) to examine the curricula of each class—the number of periods per subject per week;

(b) to establish a set of pupils' requirements in the matter of premises and teachers per week;

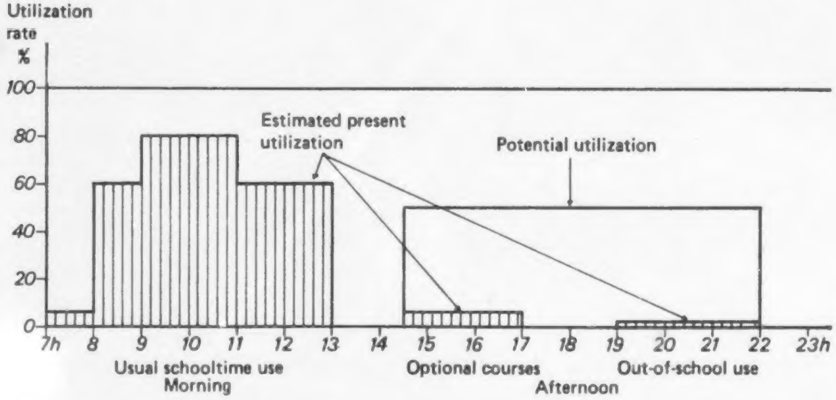

FIGURE 12. *Utilization rate of general classrooms (Aurich, 1971).*

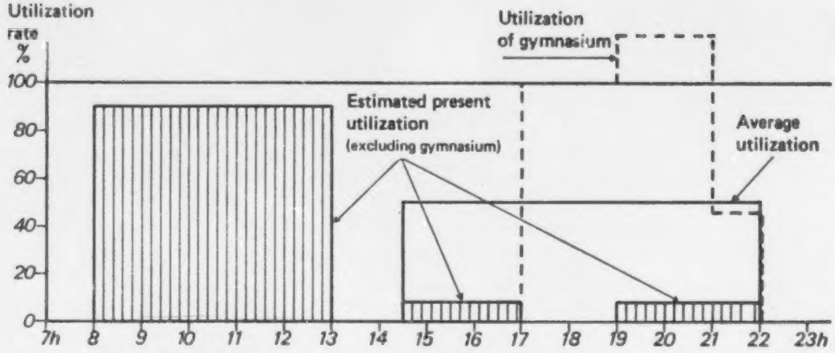

FIGURE 13. *Utilization rate of special classrooms (Aurich, 1971).*

(c) to decide on minimum and standard rates of occupation of specialized sections of the premises calling for the lowest number of periods per week;

(d) to decide on a system of minimum and standard use to be made of specialized teachers—minimum and standard duration of a teacher's time.

But this is not enough; it is also necessary to take into consideration the rates of promotion from primary schooling to first year of middle school decided upon by the government; possibly also, in the middle school or the first cycle of secondary, it will prove useful to determine the rates of admission per option; and finally, rates of entry into the various streams of the secondary school, or second cycle of secondary must be calculated.

In this way the limitations on the use of resources, which means premises and staff, can be compared with the requirements of the education plan (i.e., what is being aimed at in the matter of provision of education by type and kind of instruction). It should then be possible to arrive at 'standard establishments' matching the curricula and pedagogic structures. For purposes of illustration, it seems helpful to set out quite clearly the procedure followed in defining a nucleo consisting of primary schools and middle schools of the semi-rural type in the reports on the San Ramón area of Costa Rica (see Appendix I to this chapter). What is important to note, in particular, in the Costa Rica example is firstly the need that arose to carry out a separate analysis for teaching staff and for premises, and secondly, the numerous factors influencing the way standard schools were to be defined.

Fixing minimum and standard sizes calls for nothing less than a monograph taking account of all the pedagogic, economic, administrative and geographical factors influencing decisions as to types of schools.

The final shape of the catchment area is dictated by what the school is called upon to do, which may be 'serving such and such a category of people', or 'providing this or that type of training'.

Among the factors which determine the shape and size of catchment areas are the regulations factor, the infrastructure, the administrative factor, time from home to school (not forgetting physical relief and the means of transport available), the political factor, the part played by the private sector, and social and pedagogic factors.

Standardization of premises and physical facilities involves defining the minimum, optimum and maximum sizes for schools.

Minimum size, a concept of utility in rural conditions, principally depends on the structure of the schooling being given and the pedagogic 'facts of life' prevailing in the school in question.

Defining optimum size is not an easy matter because the ideas of educationists and economists differ. In practice, there is a preference for the idea of standard size. Maximum size, a useful concept in urban conditions, varies considerably from country to country. Whatever norm is fixed, it is frequently exceeded because of the scarcity of available land in towns and cities.

APPENDIX I

How the size of a semi-rural-type nucleo is decided on

The basic facts

Population density: 65 inhabitants per sq. km.
Cycle III age-group: 8.75% of total population
Maximum acceptable distance from home to school on foot: 4 kms.
No school-transport service
Enrolment per group: 35
Teacher, full-time equivalent: 30 hours per week
One pupil in cycle III as against two in cycles I and II
Maximum period of use of a school per week: 45 hours
Figures for use made of teachers are rounded up or down to 1/4, 1/2, 3/4, etc.
Average classroom floor-space: 50 sq. metres

TABLE A.1. Cycle III curriculum

Subject	Number of hours	Type of classroom used
Spanish	4	G
Social studies	4	G
English	3	G
French	3	G
Mathematics	4	G
Science	5	G
Industrial art and family education	3	P
Plastic arts	2	P
Music	2	P
Physical culture	2	1/2 outside 1/2 P
Religion	1	G
Optional subjects	5	3/5 G 2/5 P
	38 hours	

G = general-purposes: P = multi-purpose

The questions to be answered

Find:

1. The number of pupil-groups in each cycle;
2. The number of 'full-time equivalent' teachers;
3. The pupil/teacher ratio;
4. The requirements in the matter of premises (general-purpose classrooms, multi-purpose classrooms, outside areas);

5. The premises use indices

$$i = \frac{\Sigma c}{n \times p} = \text{total number of hours of teaching per week,}$$

n being number of classrooms required
× maximum period of use of a classroom per week,

6. Breakdown of premises by nucleo:
   —description of nucleo centre,
   —description of satellites;
7. Total floor-space for building programme.

Supposing the nucleo is centred at 'Juan Santa Maria', code: 65–66, can you draw a cycle-III catchment area as well as one for cycles I and II which are connected with it?

The solution

For 100 pupils in cycles I and II, there will be about 50 in cycle III.
Enrolments in the nucleo:
Cycles I and II = 560
Cycle III = 280
Total = 840
Population density = 65 inhabitants per sq. km.
(presupposing a cycle-III catchment area of 4 km. radius)
Organization of cycle III
Number of groups: 8
3 groups in 7th year
3 groups in 8th year
2 groups in 9th year
Average enrolment per group: 35
Total cycle-III enrolment: 8 × 35 = 280

TABLE B.1. Cycle-III curriculum

Subjects	Hours per week	Number of groups	Total number of hours of teaching per week	Total number of teachers FTE	Type of classroom used
Spanish	4	8	32	1 (1)	G
Social studies	4	8	32	1 (1)	G
English	3	8	24	1 (0.75)	G
French	3	8	24	1 (0.75)	G
Mathematics	4	8	32	1 (1)	G
Science	5	8	40	1 (1.25)	G
Industrial art and family education	3	8	24	1 (0.75)	U
Plastic arts	2	8	16	16 (0.50)	U
Music	2	8	16	16 (0.50)	U
Physical culture	2	8	16	16 (0.50)	1 E/1 U
Religion	1	8	8	8 (0.25)	G
Optional subjects	5	8	40	40 (1.25)	3 G/2 U
Total	38		304	14 (9.5)	

G = general-purposes classroom: U = multi-purpose classroom
E = outside: FTE = full-time equivalent

Teacher-requirements for cycle III

Number of teachers: 14, of which 5 full-time
3 3/4 time
3 1/2 time
3 1/4 time
Number of full-time-equivalent teachers: 9.5
Pupil/teacher ratio: 29.4

Classroom-requirements for cycle III

Number of hours of classroom-use per week:

General-purposes classrooms:	216 hours
Multi-purpose classrooms:	80 hours
Outside:	8 hours
Total	304 hours

$$n = \frac{\Sigma c}{i \times p}, \text{ where}$$

n = number of classrooms required
i = index of use
p = maximum period of use of a classroom per week
Σ c = total number of hours of teaching per week

General-purpose classrooms

$$\frac{n}{g} = \frac{216}{0.8 \times 45} = 6 \qquad \text{6 classrooms}$$

$i = 80\%$

Multi-purpose classrooms

$$\frac{n}{mu} = \frac{80}{0.8 \times 45} = 2.22 \qquad \text{3 classrooms}$$

$i = 59\%$

Classroom requirements for cycles I and II

Cycles I and II
number of teams: 2
enrolment per class: 35
total enrolment: 560

$$\text{Number of classrooms: } \frac{560}{35 \times 2} = 8$$

TABLE B.2. Floor-space for teaching purposes

	Number	Floor-space per classroom	Total floor-space (m²)
Cycle I and II classrooms	8	50	400
Nucleo centre special hall	2	50	100
Cycle III general-purpose classrooms	6	50	300
Cycle III multi-purpose classrooms	3	75	225
			1,025

TABLE B.3. Breakdown of classrooms by cycle and school

	General-purpose classrooms		Special-purpose classrooms	
	I–II	III	I–II	III
Central school	3	6	2	3
Satellite school 1	2			
,, ,, 2	2			
,, ,, 3	1			
Total	7	6	2	3

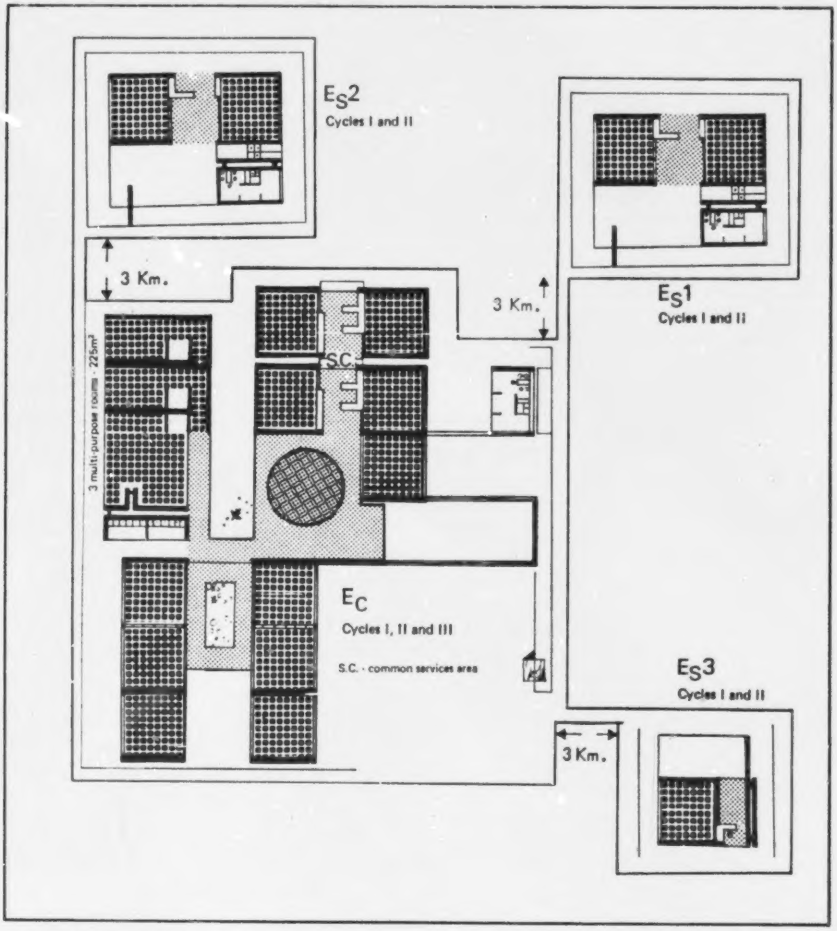
E_S2
Cycles I and II
E_S1
Cycles I and II
3 Km.
3 Km.
3 multi-purpose rooms · 225m²
S.C.
E_C
Cycles I, II and III
S.C. · common services area
E_S3
Cycles I and II
3 Km.

FIGURE 14. *Ground-plan of the nucleo.*

APPENDIX II

Some technical problems in school mapping[1]

The publication of the results of a research project on the location of schools, in the form of a series of individual country case studies rounded off by a synthesis report, inevitably entails the preparation in a suitable form of a number of maps to illustrate, in each case, the location in the country concerned of the region or district studied, its relief and principal physical features, its existing school network, and the proposals made for rationalisation or development. For certain studies other maps may be of importance, showing density of population, or development projects in the region, or participation rates. In brief, the first necessity is for a set of general basic outline maps, on which the various items can be plotted as required.

It is at this stage that the complications arise. Very early in the life of this project a member of the research team drew up a preliminary list of requirements, asking that a set of symbols be devised making it possible to differentiate clearly between various types of schools. In the case of primary schools, for example, it was desired to show clearly by means of symbols public and private schools, single-sex and mixed, single- and double-shift, religious affiliation, boarding and day, and various other possibilities. Faced with the demand for a unique and unambiguous symbol to represent a private catholic girls' first-level day school working two shifts but offering only the first four primary grades—and with a canteen—the Institute's designer threatened to resign.

A study was made of available existing school maps produced by various countries in the hope that some basic principles might be found; for example, the maps of each educational region issued by the French Ministry of National Education, the series for the Federal Republic of Germany produced in Hanover by the Institut für Städtebau, Wohnungswesen und Landesplanung, and others. From the Institute's point of view, however, these maps, while excellent in themselves and for their purposes, presented two drawbacks: firstly, while each of the examples studied made use of a logical and coherent system of symbols for its schools, each system was completely different; and secondly, all of them relied to a very large extent on the use of colour. But the IIEP had decided, for financial reasons, that colour printing must be avoided; and it was also felt essential that the use of symbols must be consistent throughout the series, to facilitate comparisons between the various countries (particularly in the synthesis volume, in which a number of the maps from the individual studies would be reprinted).

With these two limitations in mind, and after considerable experimentation and discussion, it was finally decided to adopt only two simple basic symbols: a circle for all first-level schools, and a diamond for all second-level schools. The diamond offered the advantage that, divided horizontally, it could represent either lower second level (a downward-pointing triangle) or upper second level (an upward-pointing triangle) in the case of systems using this division of secondary education. Both symbols permitted a limited range of variations—outline or solid, with a letter or number inserted or contiguous, etc.

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[1] This appendix has been contributed by Eric Hughes, IIEP staff member, who was responsible for the supervision and execution of the cartographic work for the entire research project on the school map.

It was obvious, nevertheless, that some confusion could still arise from the number of different aspects of educational provision that had to be taken into account. The compromise solution adopted to overcome this problem was to make a minimal sacrifice of complete consistency while increasing when necessary the number of maps provided. Instead of attempting to show on a single map all the possible variations of first-level schools in a given district, separate maps of the basic school network would show, for example, the distribution of public and private institutions, of schools offering full primary education and those with a limited number of grades, and so on—the number of maps being determined by the nature of the educational system and the specific problems discussed in the study. While this solution has the drawback that solid and outline circles respectively represent different aspects of educational provision on different maps, reference to the legend should avoid confusion; while for the purposes of comparison between studies the same system of differentiation has been used throughout the series as far as possible.

An entirely different problem was posed by the need to deal with conventional symbols—boundaries, roads, rivers, railways, etc. Although there is no universally accepted code of representation, there is a fairly wide consensus of agreement as far as the officially produced maps of most countries are concerned—the Ordnance Survey maps of the United Kingdom, the maps of the French Institut Géographique, for example—and this is generally followed by the commercial producers of maps. Here too, however, the code is largely based on the use of colour, particularly for relief and natural features—lakes, rivers, forests, deserts, etc.

In this respect, each of the case studies in this series had to be considered on its merits. In some countries there are different boundaries for municipal divisions (cantons, counties, districts) and for educational areas; in some it is important to differentiate between major and minor roads, roads usable only in dry seasons, and footpaths; in others, the relief and such natural barriers as rivers are important factors in determining school location. And, of course, in all the studies the delineation of the catchment areas of schools, particularly at the secondary level, is of major importance.

The principle adopted by the IIEP has been to emphasize, on each map, what is important in its particular context. When the object of the map is to show, for example, how the siting of schools is dependant on such factors as accessibility, the possibility of providing a school bus service, and so on, natural features and roads are emphasized; a map of the same district showing the projected enrolment in each school, however, may well be completely blank except for the schools and numbers.

The publication of these case studies has involved the drawing of nearly 200 maps. The IIEP is fully aware that not all of them meet the standards it had set itself, and that in all probability none of them will meet the more exacting standards of the professional geographer. It is hoped, however, that they may stimulate some consideration of the technical problems of school mapping, and that such consideration may contribute to an eventual acceptance of some degree of standardization of presentation. More particularly, it is hoped that the Institute's efforts to deal with the problem within the limitations of black-and-white printing may be of value to members of educational planning units in developing countries, where colour printing may present technical problems and where any economy, however small, may help them to balance their already over-stretched educational budgets.

VIII. Methods of diagnosis

The purpose of diagnosis is to reveal any possible 'anomalies' in the school map in the course of the base year, such as schools insufficiently used or, at the other extreme, overloaded, to draw attention to any inequalities in provision of schooling, in the areas of access to schools, premises and equipment, teachers' qualifications, etc., and to make it possible to draw conclusions in relation to rationalizing the stock of schools before any potential reforms of the education system are introduced and without regard to the Plan's targets in the matter of education. For secondary education the framework for analysis is the region, and for primary education the area or sub-region. It is clear, then, that diagnosing is an essential stage of school-map procedure; the conclusions drawn will be entered as justifications for the proposals to be made on the drawing-up of the planned map.

The making of the diagnosis presupposes (a) the taking of a decision on statistical units of an appropriate nature for purposes of analysis [pupil, pupil category (sex, class origin, race, etc.,) school, school group (size, catchment area, other school divisions), the administrative district]; (b) the taking of a decision on parameters or indicators (demographic, educational, environmental, economic, etc.).

Once these decisions are taken, it is possible to analyse the data and make a diagnosis of the school map in each district under investigation. We begin here with some general remarks on how statistical units and parameters are decided on and we shall then go on to give, for purposes of illustration, one or two examples of diagnosis tables resulting from case studies. Finally, a number of methodological guidelines will be laid down to facilitate the work on school-map diagnosis.

A. General

1. Appropriate statistical units

These will correspond to the goals pursued in the work of diagnosis.

(*a*) Where the aim is to investigate schooling inequalities by pupil category, the statistical unit will be the pupil category; in countries where we find inequalities for reasons of sex, socio-economic class of the pupil, race, age, the place where pupils live, their creed, etc., a breakdown should be made of pupils enrolled in terms of these criteria. In this connection, it is to be noted that the available educational statistics usually categorize by sex and sometimes by race, but will seldom be found making distinctions along the other lines we have mentioned. The information required will therefore have to be obtained by means of *ad hoc* enquiry. This can be done by means of blank statistical forms to be filled up in each school, with as many 'columns' as is found necessary. Crossed tables bringing in other factors may be contemplated; the following non-exhaustive list of such tables, to be adapted to the actual situation in each country, is given for purposes of guidance.

Table 1
age × sex × course. A distinction is to be made for pre-school and the year of admission to each cycle as well as for the terminal years of each cycle.
Table 2
sex × result rate × by course and by cycle. It will only be possible to draw up this table if data are available on repeats, promotions, drop-outs and new admissions.
Table 3
sex × age × participation rate.
Table 4
race × age × participation rate.
Table 5
socio-professional class × age × participation rate.
Table 6
creed × age × participation rate.

Drawing up Tables 3 to 6 calls for a breakdown of pupils by geographical area (see (*b*)) and of demographic data by age and geographical area (see (*b*) and Chapter VII). In the following remarks 'X' denotes the 'pupil category' variable, i.e. sex, race, etc.

Table 7
'X' × means of getting to school × time taken in getting there. In the context of inequalities in schooling conditions, 'time taken' is a more significant variable than is the distance between the pupil's home and his school. On the other hand, distance is a more pertinent factor when it comes to laying down the boundaries of catchment areas. Both sets of data should therefore be collected. IIEP case studies make it clear that there is usually a lack of precision in this sort of information, particularly where rural areas in developing countries are concerned. Getting the address of each pupil would present little difficulty, but the lack of very detailed maps and the multiplicity of village and hamlet names make it impossible to establish distances with any accuracy and still more difficult to determine the length of time taken to get to school. In the case of primary-school children at least, the best course is to get the information directly from the teachers on the basis of a detailed map of the district.
Table 8
'X' × participation rate in the different secondary-school specialized streams, and purpose of school (general, technical or other).
Table 9
'X' × status × authority administering school. The object here is to reveal the extent to which schools 'specialize', as regards pupil categories.

(*b*) When we come to look at the influence of the geographical location of schools or the extent to which certain parameters influence schooling conditions, the smallest statistical unit is the school. However, in practice it is only possible to make a complete analysis school by school when the number of schools is fairly small, a dozen or so, as in the case of districts with about 100,000 inhabitants, mostly with a fairly small number of secondary schools. Where, however, districts have a higher population density and/or the first-level or the middle-school map is in question, schools have to be lumped together in obedience to certain criteria:

(i) The size criterion is useful insofar as it is an important factor in the drawing of catchment-area boundaries on the map being planned, and also because it tends to be correlated with schooling conditions, including teacher/pupil ratio, the existence or non-existence of teachers for specialized subjects, standards of premises and equipment, whether there are boarding-schools, etc.

(ii) The catchment-area criterion for secondary schools is a useful one when the investigation concerns the primary-school and/or middle-school map in semi-rural or rural areas. We know from experience that there is a close relationship, and one which should be emphasized, between the various school levels. This is partly due to the 'neighbourhood effect'.

(iii) The 'homogeneous geographical area' or 'homogeneous catchment perimeter' criterion is much more difficult to apply, but it is a very useful one for drawing attention to geographical inequalities and for drawing up proposals for map rationalization. What is this criterion? If we divide up a district into homogeneous areas it means that we are putting schools together in such a way that each group is part of a continuous geographical area, without 'enclaves', and that there is only a low degree of divergence in the values of the variables inside each group. On the other hand, there will be a very high degree of divergence of variables as between the groups. The argument underlying this criterion is that each area is a single 'whole' in respect of schooling characteristics, i.e. the same teacher/pupil ratio, the same degree of attraction for certain members of the teaching profession, the same pupil category, etc. No simple method is to be devised for dividing up districts into homogeneous areas. It is a *sine qua non* that the district should be well known, particularly to those in charge of the school map regionally, and successive repeats of the procedure should be emphasized. The first thing is to identify the largest population centres, urban and other, and then the areas of lowest population density; one then divides up the district on the lines of this first criterion. An initial test is made by drawing up a number of diagnosis tables on the basis of this regrouping, after which the boundaries are modified in order to make the data for each area more 'homogeneous'; a further test is made, and so on and so on, until there is no longer any possibility of proceeding without creating 'enclaves' inside the areas.

(iv) The administrative (or school) districts criterion. This is the easiest criterion to respect because data are usually available for the purpose. For instance, demographic data are provided according to census district or electoral rolls. It is consequently a very simple matter to take the same geographical areas for purposes of diagnosis. School districts and/or school-inspectorate districts do not usually correspond to the same geographical areas as those made use of in population statistics, whether census or electoral; and it then becomes necessary to make an estimate of the population of districts astride two school districts.

This is not a very easy matter, since one has to have very detailed data on geographical population dispersal. The result is that one proceeds in a rough and ready manner, using the maps showing inhabited localities or making a quick visit to the census authorities.

(v) The 'urban quarter' criterion in town areas. An 'urban quarter' may be variously defined; one can, for instance, follow internal municipal boundaries. The important thing is that the population of school age to be found in it should be of the same order of size as that of a 'homogeneous catchment perimeter' in rural areas. This criterion, it is true, is not very meaningful in old towns. Here, there are more possibilities for school transport, and here, also, private schools are to be found in large numbers, this making the drawing of boundaries for school catchment areas particularly difficult. It seems advisable to make use of this criterion only in connection with diagnosis of the primary-school map. When it comes to the secondary-school map, it seems best to choose the school itself, or the group of schools (by organizational authority for instance) as the statistical unit.

Using one or other of these criteria, one can draw up a number of tables to determine:

(a) The influence which the size of schools has on schooling conditions, including standards of teaching staff, pupil/teacher ratios, canteen and boarding-school facilities, premises and equipment standards, floor-space available per pupil, etc., and on teaching costs, in terms of current expenditure per pupil, cost per 'occupied place', etc., on the basis of which it will be possible to get an idea of the rates of utilization of premises and equipment;

(b) The effects of the schools' geographical location (urban areas, semi-urban areas, small inhabited places; villages with more than 1,000 inhabitants, villages with 500 to 1,000 inhabitants, etc.); school frequentation rates; difficulties associated with provision of schooling; the power of attraction of certain areas, etc.

2. *The maps to be used for purposes of diagnosis*

The first step to be taken in connection with any diagnosis of the school map is of course the locating of each school on a map. This appears to be a very simple matter, but it often leads to a lot of difficulties. Experience tells us that the maps available are usually incomplete and seldom exact. The names of villages and hamlets and smaller places are not always known, some of them are found in official statistical tables and cannot be found on the maps, while others can be found on the maps, but are not to be found in any statistical tables, and the same applies also to certain schools. The only thing to do is to enquire on the spot and in this way to pinpoint the location of each school.

The following additional maps will be found necessary for purposes of diagnosis:

(a) Maps showing the country's administrative districts, and showing its present divisions into provinces, regions, départements, arrondissements, boroughs and parishes.

(b) Relief maps showing the system of communications and other facilities, as well as infrastructures.

(c) A map showing economic activities region by region.

(d) Population maps showing densities and inhabited places.

The preparation and use of these maps calls for the adoption of a detailed and reliable code. At present, no international system for coding is in force. In the course of our work we have empirically developed a code which experience has shown to be satisfactory and cheap (in black and white), as can be seen from the cartographical illustrations to be found *passim* in this book. (A number of suggestions were given in Appendix II to Chapter VII.)

3. *Parameters or indicators to be adopted for purposes of diagnosis*

Usually, decisions on parameters can be taken at the pilot-study stage. One of the interesting features of this study is the possibility of examining a set of parameters as complete as possible, and then singling out the main ones to be used in preparing the school map at national level. The table below provides a list to serve as a basis for the work on the pilot enquiry. This is given for guidance purposes only; each country will need to adapt it to its own needs, adding a number of parameters, and eliminating others. The pilot study alone will make it possible to draw up a *simplified* list of parameters to be used when the procedure is being applied nation-wide.

List of parameters

I. *Environment*
(a) Relief questions: impassable obstacles, including rivers and streams, lakes, cliffs, etc.;
(b) The road network, and other means of communication, usable during the whole of the school year;
(c) How social needs are provided for, including housing (types of dispersal, centres of activity classified as primary, secondary, tertiary, etc.);
(d) Economic data; factories, large-scale enterprises, dams, hydro-electric power stations, tourist centres, 'reservations', etc.

II. *Demographic parameters*
(a) Total population and breakdown by type of inhabited place;
(b) Population density;
(c) Breakdown by age, sex, and creed; data for the age-group 0–19;
(d) Previous rates of national growth;
(e) Population movements: data on movements inside the region; figures for movements into, and out of, the regions contiguous to the region under investigation and into, and out of, those where the migratory flows are most pronounced.

III. *Institutional parameters*
(a) Structure of the school system;
(b) Powers of control and administration;
(c) Procedures for admission, selection, etc.;
(d) Means of financing;
(e) Systems of assistance to parents and pupils (e.g. regulations for allocation of transport subsidy);
(f) Regulations in force for closing and opening schools and for extensions to them;
(g) Other regulations pertinent to the organization of the school map.

IV *Educational parameters*

1. *Enrolments*
   - 1.1 Growth by sex, age, etc.
   - 1.2 Admission, promotion, and repeater rates;
   - 1.3 Absenteeism and drop-out rates;
   - 1.4 Boarders, day-pupils, system in respect of canteens;
   - 1.5 Breakdown according to where pupils live;
   - 1.6 Breakdown according to time taken to get to school;
   - 1.7 Double-shift and single-shift systems;
   - 1.8 Breakdown of pupils according to categories set out in Section A (*I*) above.
2. *Staffing*
   - 2.1 For teaching purposes: qualifications, specializations, teachers' salary scales; breakdown by sex; pupil/teacher ratios;
   - 2.2 For administrative purposes: by function, qualification, their places in the salary scales, staff/pupil ratios for day-pupils and for boarders;
   - 2.3 For purposes of general services, as for 2.2;
   - 2.4 For all purposes: part-time, full-time (with conversion key) according to the use made of staff (single or double or treble).
3. *Teaching activities*
   - 3.1 Timetables of lessons;
   - 3.2 How school-time is used by pupil groups, and average size of the groups;
   - 3.3 How teachers are allocated between the groups;
   - 3.4 How teachers are allocated as between classrooms.
4. *Premises and equipment*
   - 4.1 Geographical locations;
   - 4.2 Legal standing (whether rented, State-owned, etc.);
   - 4.3 Analysis in respect of land available:
     - (a) according to the manner of its use (for teaching, administration, sports activities, leisure activities, various uses connected with canteens or boarding establishments, others);
     - (b) according to the number of square metres available per pupil:
     - (c) according to services laid on, i.e. water, gas, electricity, heating, sanitation, etc.
5. *Financial information*
   - 5.1 Sources and types of financing
   - 5.2 Unit costs.

Cases arise where it is useful to combine parameters and to produce 'composite indicators', for instance the pupil/teacher ratio with staff's qualifications to produce an indicator for 'standard of teaching staff/pupil relationship', or the number of square metres of land-space available per pupil, the amount of equipment for open-air activities and the standards they meet to produce a 'sporting activities' indicator, and so on.

In this way the various statistical units can be classified in the light of the standard and the amount of the services (educational or other) they render, and certain conclusions can be reached about the degree of urgency of what has to be done:[1]

- (a) highest priority and urgency (relating to building or re-adaptation of premises and equipment);
- (b) priority
- (c) non-priority.

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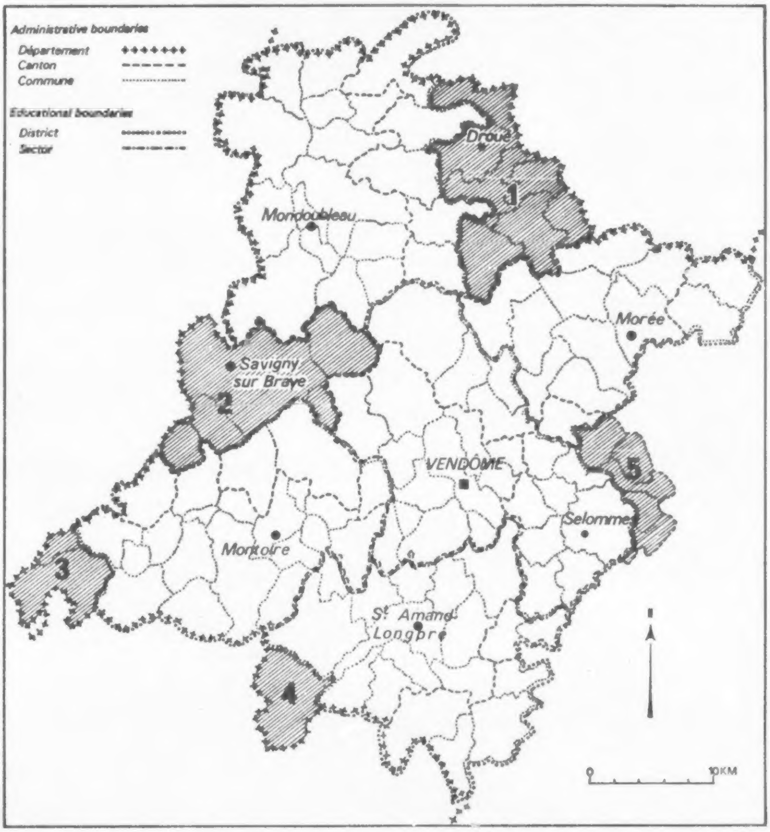
[1] See the study on the Gharb rural area in Morocco.

B. Illustrations from case studies

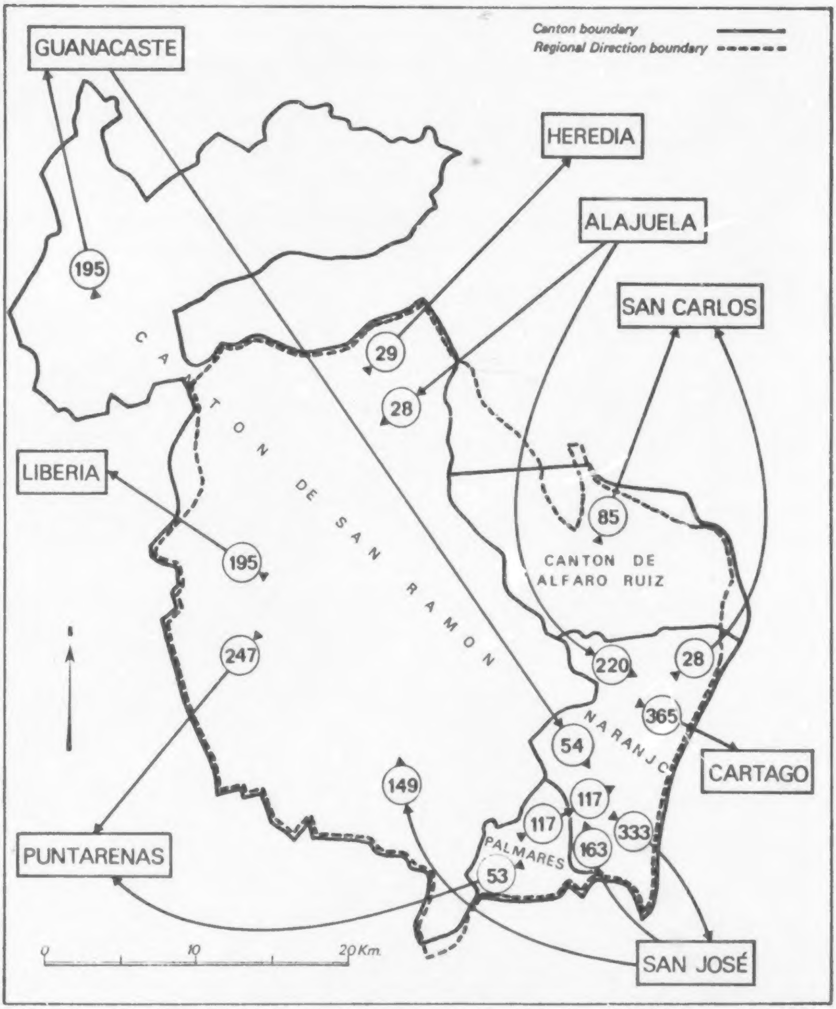
To show how methods of diagnosis are applied, we have taken a number of maps and tables from case studies. The examples given take the form of a series of standard questions for which one should attempt to find answers while the diagnosis is being carried out.

Question 1

Do the boundaries of the school district, and those of the administrative district of which it is part, coincide? If they do not, how are the demographic data to be adjusted? Map 27 is of the Vendôme district in France: as the reader can see, the administrative and school boundaries do not coincide. The demographic data have to be corrected, and this is done by subtracting the population figures of the parishes and groups of parishes marked 1, 2, 3, 4 and 5.


Administrative boundaries
Département
Canton
Commune
Educational boundaries
District
Sector
Droué
1
Mondoubleau
Savigny sur Braye
2
Morée
VENDÔME
5
Selommes
Montoire
3
St Amand Longpré
4
0
10KM

Map 27. *Vendôme district, France: disparities between administrative and educational boundaries.*


Canton boundary
Regional Direction boundary
GUANACASTE
HEREDIA
ALAJUELA
SAN CARLOS
LIBERIA
CARTAGO
PUNTARENAS
SAN JOSÉ
CANTON DE SAN RAMON
CANTON DE ALFARO RUIZ
NARANJO
PALMARES
195
29
28
85
195
247
220
28
365
54
149
117
117
333
163
53
0
10
20Km

Map 28. *San Ramón, Costa Rica: movement of population into and out of the area.*

Question 2

Do population movements occur (a) between the region under investigation and 'outside', and (b) inside the region? If this is so, record the demographic flows and estimate what adjustments are to be made. Map 28 shows population movements for the area of San Ramón in Costa Rica. The effects of the movements are as follows:

The canton of San Ramón: 28+149−195−247−29−195 = −489.

The canton of Alfaro Ruiz: −85.
The canton of Naranjo: 220+54+117+163−28−365−333 = −172.
The canton of Palmares: −117−53 = —170.

These are data which it is not always easy to obtain. It is suggested that information on such movements supplied by population censuses should be made use of, and supplemented if possible by information provided by the specialized investigations usually undertaken by the Labour Department.

Question 3
Once the boundaries of 'catchment areas' have been laid down, what contrasts are revealed in relation to pupils' school participation? That they can be of more than one order is clear from Table 15, which is given as an example. It shows unequal attendance rates at the nursery school and in the first four years of primary school and is based on an analysis of 15 catchment areas of the region of Kaski in Nepal. Rates vary from 10.6 per cent to 93.8 per cent where the nursery school is concerned; from 30.3 per cent to 97 per cent for boys' and girls' primary school taken together; and from 3.6 per cent to 64.5 per cent for girls.

TABLE 15. Apparent attendance rates in Nepal in 1972

			Primary			
Areas	Nursery	Descending order	Boys and girls	Descending order	Girls	Descending order
A	65.9	3	97.0	1	64.5	1
B	93.8	1	53.6	6	21.4	3
C	10.6	15	51.3	7	13.9	8
D	40.1	12	60.6	2	15.9	5
E	62.0	7	43.1	9	13.8	9
F	65.1	4	46.1	8	14.4	7
G	14.0	14	57.5	4	27.6	2
H	45.9	11	59.5	3	18.0	4
I	73.8	2	46.4	10	11.7	10
J	31.7	13	37.4	13	9.9	11
K	53.2	9	38.8	11	7.6	12
L	63.8	5	38.2	12	7.6	12
M	57.0	8	30.3	15	4.4	14
N	48.5	10	37.1	14	3.6	15
O	62.9	6	56.3	5	14.9	6
Average	51.9		54.0		20.2	

Classification of the areas in terms of the three criteria reveals a number of 'anomalies'. Area C is classified fifteenth for nursery-school attendance, and seventh to eighth for primary-school attendance. Area D is classified second for boys' and girls' primary-school attendance, but fifth for girls alone; and so on.

Question 4
What differences are to be seen in retention rates (promoted or repeating) and drop-outs as between the catchment areas?

Table 16 indicates that the differences can be considerable from one catchment area to another. The data in question are furnished by the San Ramón area of

TABLE 16. Promotion, repeater and drop-out rates in primary education

Promotion rates

Region	I–II	II–III	III–IV	IV–V	V–VI
SRU	81	86.5	89	89	88
SRR	68	79	71	75	74.5
NPU	73	77	78.5	78	86
NAR	80	86	89.5	88	70
ZA	79.5	66.5	73.5	74.5	75
Regional average	76.2	81.0	82.5	84.2	87.5

Repeater rates

Region	I	II	III	IV	V	VI
SRU	22	13	12	8	7	0.5
SRR	25	17.5	15	10	6	0.7
NPU	24	20	14.5	14	10	0.3
NAR	12.5	7.5	9	8	11	1
ZA	20	19	25.5	14.5	15.5	0.7
Regional average	19.7	14.7	11.6	8.4	5.0	1.0

Drop-out rates

Region	I–II	II–III	III–IV	IV–V	V–VI
SRU	−3	0.5	−1	3	5
SRR	7	3.5	14	15	19.5
NPU	3	3	7	8	4
NAR	7.5	6.5	1.5	4	19
ZA	0.5	14.5	1	11	9.5
Regional average	4.1	4.3	5.9	7.4	7.5

Costa Rica. In the SRU area there are *negative* drop-out rates, and strongly positive rates in other areas. The explanation for this lies in the internal population movements of the area under investigation: children leave a school in one area in order to enrol in SRU, the area covering the regional capital of the district.

Question 5

Can one expect to find considerable differences between one catchment area and another in the case of pupil/teacher ratios? The investigations carried out reveal very significant differences from one catchment area to another. Even in a country such as Germany, and in an area as small as the Aurich district, pupil/teacher ratios can vary from 17.5 at Grossefehn to 36 in the Aurich-West catchment area.

The explanations for these variations are many; they include teacher shortages, the organization of lessons in more than one group, insufficient enrolments, leading either to small schools with retention of one or two teachers or to the closing of small schools. School size, in fact, is a determining factor for changes in the ratios. As long as there is a situation in which some catchment areas have a large number of small schools while others, with a lower degree of population dispersal, possess more large-size schools, pupil/teacher ratios will be found to vary. This is illustrated by Table 17 in respect of the Chahroud area in Iran. Pupil/teacher

TABLE 17. Pupil/teacher ratio resulting from size of enrolment in schools (Chahroud, Iran)

Numerical Order	Parishes	25 pupils or less	26–50 pupils	51–75 pupils	76–100 pupils	101–150 pupils	151–200 pupils	201 pupils or more	Totals
1.	Centre of Chahroud	—	—	—	—	29.5	29.5	32	31.5
2.	Dehestan Bastam	16	31	31	39	33.5	31	34	33
3.	Dehestan Biardjomand	18	22	30	—	32	30	26	28.5
4.	Dehestan Toroud	—	35	—	43	—	—	—	37
5.	Dehestan Houmeh	21	24	34	35	36.5	—	30	31.5
6.	Dehestan Khartouran	25	31	—	—	—	—	—	29.5
7.	Dehestan Deh Molla	—	23	33	30.5	35	—	—	30
8.	Dehestan Foroumad	24	34	31	46	—	—	27	31.5
9.	Dehestan Kalpouche	21	37	—	32	—	—	—	33.5
10.	Dehestan Kalateha	18.5	34.5	38	50	34	—	—	34.5
11.	Dehestan Mayamey	25	24	23	30	30	—	—	27
	Towns and rural areas, total:	20	30	30.5	37	33	30	32	31.5

ratios vary from one catchment area to another, from 28.5 to 37, and in proportion to the breakdown of schools by size. The average ratio is 20 pupils per teacher in schools with less than 25 pupils (one-teacher schools) as opposed to 37 pupils per teacher in schools with 76 to 100 pupils.

Question 6
How may one compare the way premises are used (rates and duration) in the various catchment areas?

Figure 15 is provided by way of example, and illustrates conditions in County Sligo in Ireland. Note the distinction by classroom category (general, specialized, prefabricated, rented); this is particularly useful in the case of secondary or (and) technical schools.

Question 7
How are primary-school leavers allocated as between middle schools and secondary schools?

Table 18 covers the situation in the Kaichadoris district in the Lithuanian SSR. The information provided is of particular importance when it comes to calculating place requirements (or shortages) in middle or secondary-school networks.

FIGURE 15. *County Sligo, Ireland: utilisation rates for general*

CA	SCHOOL	AREA IN ACRES	SPECIAL ROOMS											
			LABORATORY				WORKSHOP						HOME ECON.	
			1	2	3	4	1	2	3	4	5	6	1	2
ST	Summerhill	5	☐	☐	☐		☐	☐						
	Ursuline	25	☐	☐			☐						☐	
	Mercy	4	☐				☐						☐	☐
	Gramm. Sch.	10	☐										☐	
	Voc. Sch.	10	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
BM	Mercy	30	☐											
	Voc. Sch.	1	☐				☐	☐					☐	
TC	Marist	40	☐										☐	☐
	Voc. Sch.	12.5	☐				☐	☐					☐	
	Benada	10	☐										☐	
EC	Convent	2	☐				☐	☐					☐	
EK	Voc. Sch.	13	☐				☐	☐					☐	
BS	Mercy	0.5	☐				☐						☐	
GR	Voc. Sch.	8	☐				☐	☐					☐	
CL	Voc. Sch.	5.5	☐				☐	☐					☐	
GT	Voc. Sch.	5.5	☐				☐						☐	
Total no. of rooms			22				24						16	

NOTE Gymnasiums, multi-purpose rooms and libraries are not included. All schools have a thirty hou

TABLE 18. Concentration of school enrolments in secondary schools in the Kaïchadoris district (dismantling of all elementary and eight-year schools), according to data for 1967/68

Secondary schools	Number of pupils in secondary schools (1967/68)	Pupils coming from eight-year schools	Pupils coming from elementary schools	Pupils in secondary schools after closure of eight-year and elementary schools
Kaïchiadoris	1151	861	146	2158
Jejmapiaï	624	454	132	1210
Jasliaï	515	303	160	978
Krouonis	331	538	97	966
Roumjichek	317	297	81	695

Question 8

What is the breakdown, as between the various areas, of premises (by category, by the manner of use and by standards)?

The five areas singled out in the diagnosis of the school map of the Zahlé region in Lebanon (see Table 19) have rather varying stocks of premises, if one is to judge by their 'category', the way they are used, and their 'standards'.

ialized classrooms (hours of use as percentage of total possible), 1970/71.

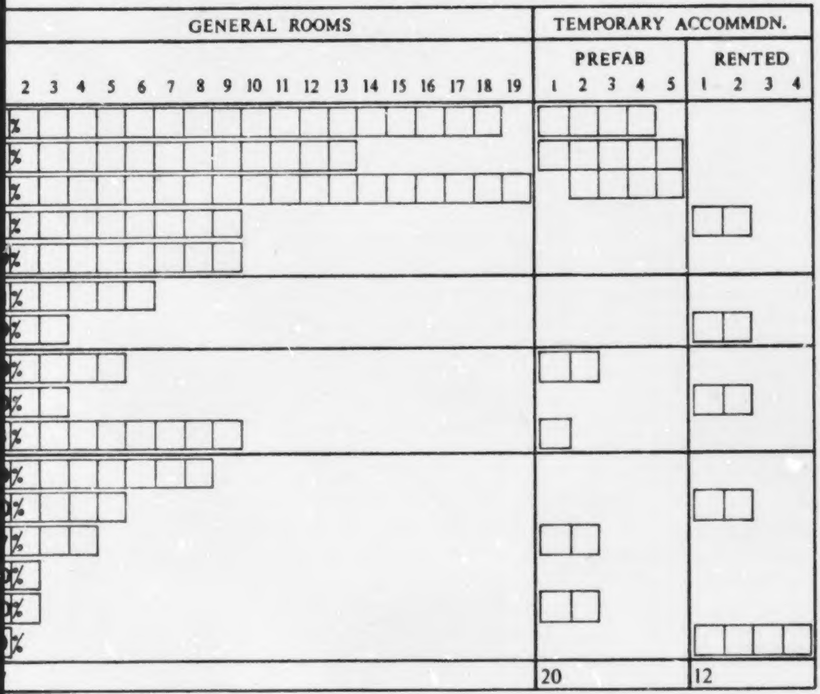


TABLE 19. School premises in the Zahlé region in Lebanon

Catchment area	Zahlé	Reyyak-Ablah	Qabb Elyas Talabayah	Barr Elyas	Kfar Zabad
State-owned	5	4	0	1	1
Donated	0	3	4	0	1
Rooms:					
Total	223	104	89	32	28
Usable	182	99	76	28	26
Used	217	104	86	27	25
Classrooms	167	84	73	22	21
Headmaster's office	16	7	7	2	2
Laboratories	4	1	1	1	1
Library	1	0	0	0	0
Classified as:					
Small	89	50	67	17	19
Medium	72	34	9	5	2
Large	5	0	1	0	0

Question 9

What differences exist from one catchment area to another in respect of conditions for getting to school?

A simple way of determining these differences is to make frequentation 'histograms' for each school, or each area, according either to the distance to be covered, or time taken. As an illustration, Figure 16 gives breakdowns of enrolments in three *gombororas* in Uganda; it indicates that pupils' attitudes (the distances they are prepared to travel) vary considerably according to the type of establishment (boys', girls', co-ed) considered, and the area investigated.

Question 10

Given the differences in schooling conditions as between one catchment area and another, may one expect to find considerable differences in unit costs?

Table 20 for the Chahroud region in Iran provides an affirmative answer. The differences are considerable, ranging from a minimum of 1,881 rials to a maximum of 4,949 rials.

Question 11

How can one combine the various diagnostic parameters in order to arrive at an overall synthesis of the comparative schooling situations in catchment areas? Some indication of how to go about this task is provided by the following extract from the school-map study of the Gharb rural area in Morocco.

After defining a number of indicators and calculating the values for each indicator in the communes of the area, the authors brought in a weighting exercise to combine the indicators and so classify communes according to the total number of points they score. Communes with the lowest scores are normally those requiring priority action for the improvement of schooling conditions. Tables 21–24 show the stages in the application of this method.

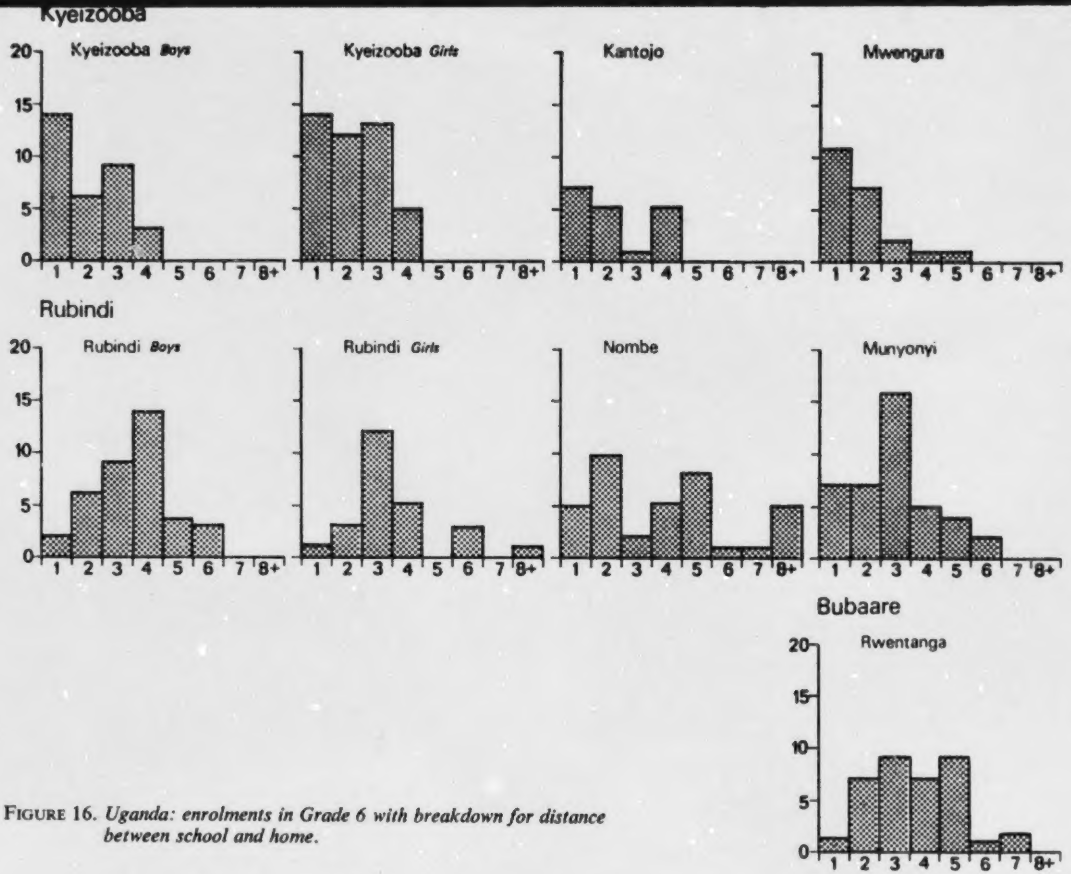


FIGURE 16. *Uganda: enrolments in Grade 6 with breakdown for distance between school and home.*

TABLE 20. Differences in unit costs from one catchment area to another in Iran

Catchment area	Number of pupils	Number of classes	Number of teaching staff	Salaries of teaching staff	Unit cost (teaching)	Other salaries
1. Centre of Chahroud	5 892	163	236	16 635	2 820	8 558
2. Bastam	3 933	112	130	8 563	2 172	1 445
3. Biardjomand	912	30	33	2 309	2 532	131
4. Toroud	261	7	7	334	1 284	—
5. Houmeh	1 222	38	41	2 450	2 004	432
6. Khartouran	118	4	4	261	2 220	—
7. Deh Molla	420	13	14	691	1 644	—
8. Foroumad	751	24	26	1 608	2 136	310
9. Kalpouche	303	10	9	480	1 584	—
10. Kalateha	552	16	16	840	1 524	—
11. Mayamey	725	26	27	2 118	2 916	178
Total of communes	9 197	280	307	19 654	2 136	2 496
Total of population	15 089	443	543	36 289	2 400	11 054

TABLE 21. Morocco: use of indicators. (a) Data

Commune	Indicators[1]							
	1	2	3	4	5	6	7	8
Ain Defali	11.6	2 131	1 826	41	1.16	10.3	9.7	0.84
Dar el Gueddari	12.7	1 225	845	50	1.45	41.9	20.4	1.78
Had Kourt	11.5	1 274	1 147	34	1.11	17.6	13.3	1.17
El Jemaa Haouafate	10.9	1 899	1 403	45	1.35	23.6	11.9	1.03
Jorf el Melha	12.4	1 042	919	31	1.13	23.9	14.8	1.28
Karia ben Aouda	26.0	3 483	6 269	15	0.55	6.4	2.1	0.18
Khémichet	11.8	1 743	1 569	36	1.11	16.3	10.4	0.91
Lalla Mimouna	11.4	534	668	24	0.80	44.5	22.1	1.95
Nouirate	39.9	1 271	1 399	29	0.90	14.5	11.6	1.02
Sidi Mohamed el Ahmer	26.0	3 457	6 050	18	0.57	8.4	2.6	0.22
Souk Tleta	11.9	681	564	34	1.16	28.6	25.0	2.17

[1] The indicators used are as follows:
1. Number of inhabitants served by a school in an area of 1 sq. km.
2. Number of inhabitants per school in the commune.
3. Number of inhabitants per teacher.
4. Number of pupils per unit of school premises.
5. Number of classes per unit of school premises.
6. Apparent participation rate at age 7.
7. Apparent participation rate, ages 7–14.
8. Differential selections index: $\frac{\text{apparent participation rate of commune}}{\text{apparent participation rate age 7}}$

Maintenance costs	General and administrative expenses	Cost of school textbooks	Rent of buildings	Total costs excluding teachers' salaries	Unit costs excluding teachers' salaries	Total unit cost
74	2 816	595	502	12 545	2 129	4 949
49	1 904	397	24	3 819	970	3 142
11	441	92	—	675	740	3 272
3	126	26	—	155	597	1 881
15	591	123	—	1 161	950	2 954
2	57	12	—	71	597	2 817
5	203	42	—	250	597	2 241
9	364	76	—	759	1 009	3 145
4	147	31	—	182	597	2 181
7	267	56	—	330	597	2 121
9	351	73	—	611	842	3 758
114	4 451	928	24	8 013	871	3 007
188	7 267	1 523	526	20 558	1 362	3 762

TABLE 22. Morocco: use of indicators. (b) Scale.

Indicators[1]						Points awarded
1	2	3	4	5	6 & 7	
60 or more	less than 500	less than 400	from 35 to 40	1	30% and more	5
from 40 to 60	from 500 to 800	from 400 to 650	from 30 to 35	from 0.8 to 1.15	from 25 to 30%	4
from 20 to 40	from 800 to 1 500	from 650 to 1 000	from 25 to 30	from 1.15 to 1.35	from 15 to 25%	3
from 12 to 20	from 1 300 to 2 000	from 1 000 to 2 000	from 20 to 25 from 40 to 45	from 1.35 to 1.50	from 10 to 15%	2
less than 12	2 000 and more	2 000 and more	less than 20 more than 45	less than 0.8 more than 1.50	less than 10%	1

[1] For explanation of indicators, see note to Table 21.

TABLE 23. Morocco: use of indicators. (c) Classification.

	Indicators[1]							Total of
Commune	1	2	3	4	5	6	7	points scored
Souk Tleta	1	4	4	4	3	4	4	24
Lalla Mimouna	1	4	3	1	5	5	3	22
Jorf el Melha	2	3	3	4	4	3	2	21
Nouirate	3	3	2	3	5	2	2	20
Dar el Gueddari	2	3	3	1	2	5	3	19
Had Kourt	1	3	2	4	4	3	2	19
Khémichet	1	2	2	5	4	3	2	19
El Jemaa Haouafate	1	2	2	2	3	3	2	15
Ain Defali	1	1	2	2	3	2	1	12
Sidi Mohamed el Ahmer	3	1	1	1	1	1	1	9
Karia ben Aouda	3	1	1	1	1	1	1	9

[1] For explanation of indicators, see note to Table 21.

TABLE 24. Morocco: use of indicators. (d) Synthesis.

Score categories	State of schooling conditions	Communes
Less than 14 points	Bad	Karia Ben Aouda Sidi Mohamed el Ahmer Ain Defali
14–18 points	Poor	El Jemaa Haouafate
19–21 points	Tolerable	Khémichet Had Kourt Dar el Gueddari Nouirate Jorf el Melha
22–28 points	Good	Lalla Mimouna Souk Tleta
Over 28 points	Very good	—

The list of questions is far from exhaustive. One thinks, in particular, of questions bearing upon inequalities stemming from the social class children belong to, the difficulties that certain children face in order to be accepted into the various specialized streams, the relation of the percentage of women teachers in rural areas to the attendance figures for girls, etc. Thought must also be given to a systematic analysis of all the parameters (at least at the pilot-study stage) and in particular to those which are finally adopted (for nation-wide application of the procedure). However, the foregoing tables, graphs and maps do at least illustrate the variety of the questions which underlie the drawing-up of the projected school map.

C. Methodological guidelines

In respect of each catchment perimeter, we shall look in turn at (a) enrolments; (b) teaching staffs; (c) premises; (d) unit costs; and (e) the devising of synthetic indicators.

1. Enrolments

A study of enrolments customarily comprises:

(a) an analysis of enrolment trends by levels, grades, etc. over a recent period (e.g. a five-year period);

(b) an estimate of frequentation rates by categories.

There is, of course, a difference between apparent, and actual, frequentation rates. The apparent rate is calculated by dividing enrolment by the numbers of children of school age in the age-group in question. To calculate the actual rate, one must (i) eliminate the children outside the age-group, (ii) add children enrolled from outside the catchment perimeter and (iii) eliminate children living outside the catchment perimeter.

(c) a calculation of admission or transition rates.

This is the ratio between those admitted to a new cycle in year t and those enrolled for the final class of the preceding cycle in year $t-1$.

(d) a calculation of promotion, repeater and drop-out rates.

The rate in respect of promotion from one class to another is the ratio of the numbers in these classes time-staggered by one year; the repeater rate is the ratio between the repeaters identified in year t and the numbers enrolled in year $t-1$; the drop-out rate is arrived at by the following subtraction: 100 − promotion rate − repeater rate.

(e) an analysis of journeys undertaken by pupils, establishing time from home to school and the means of getting there. If a double-entry table is set up showing pupils' movements from one perimeter to another, it is possible to define catchment areas empirically.

(f) a breakdown of children by sociological origin, which is of particular interest when it relates to the period following compulsory schooling.

2. Teaching staff

The main purpose of carrying out a diagnosis is to make possible a re-organization of supply. Since this re-organization is in turn designed to bring about a situation in which teaching staffs are made better use of, attention will be focussed on a breakdown by qualifications, the number of hours put in by teachers, the sizes of sections, and the margins between catchment perimeters and schools. To put it more precisely, the following factors will be examined in turn:

(a) teaching staff in terms of the levels and types of their qualifications and in relation to school-size and perimeters;

(b) ratios between 'enrolments by sections' and 'average audience', i.e. average numbers in groups to be taught, bearing in mind the various current arrangements made for teaching and the greater or lesser numbers of pupils involved;

(c) average number of pupils per teacher at 'full-time equivalent'. The ratio of pupils to teacher gives no indication of the actual amount of work put in by teachers. What has to be calculated is the number of teachers at full-time equivalent, taking account of the total number of hours actually put in by all teachers and the number they are normally required to work. Once these data are obtained, enrolment numbers are divided by the figure for full-time equivalent teachers.

3. Premises

This diagnosis should be carried out in the light of legislation and regulations relating to schools, including minimum and maximum size and standards for floor-space, physical facilities, etc. The basis of the examination is the information contained in the school's inventory records. Where such information is not available, it is well to undertake a census in order to obtain information on:
(a) legal status;
(b) the category of the school (day-school/boarding-establishment, level, co-educational or not, etc.);
(c) date at which built, date of most recent work done on premises;
(d) areas (plot of land as a whole, built-up section);
(e) type of construction and its condition;
(f) number of classrooms by categories;
(g) operational services (water-supply, lighting, etc.);
(h) other internal parts of premises;
(i) teaching and other aids;
(j) the use made of premises.
It is particularly useful to calculate the length of time premises are used, or the ratio between the number of periods during which a classroom is used, and the maximum number of periods available per week. The rate of use should also be established as it takes account of the ratio between the numbers using a classroom and the maximum number of pupil-places it contains.

By way of illustration, the inventory-record sheet used by the Costa Rican authorities is given in an Appendix.

4. Unit costs

In the case of elementary education the main thing is to analyse expenses on salaries per pupil enrolled, but when it comes to other levels (middle, secondary, technical, etc.), it will be of interest to compare catchment perimeters in respect of current expenditure per pupil.

5. The synthetic indicator

As we have already seen, the purpose of the synthetic indicator is to combine the various parameters (or elementary indicators) used in diagnosing so as to produce a synthetic classification scale for the catchment perimeters. Once this classification is completed, it will be possible to define the nature and urgency of what has to be done to effect an improvement in the provision of education in each perimeter. The procedure is as follows:

200

(a) select a number of indicators and calculate the values for each of them in the perimeters of the area under investigation;

(b) set up a classification scale;

(c) note each perimeter's score for each indicator;

(d) establish a weighting system to indicate the relative importance to be attributed to each indicator. In practice, one adopts equal weighting, which means that the same importance is attributed to each of the indicators;

(e) apply the weighting system to calculate the average score (the synthetic indicator) of each perimeter.

Calculating the synthetic indicator

Let: I_1, I_2, I_j, I_n, be the selected indicators

Let: v_1^i, $v_2^i \dots v_n^i$ be the values of these indicators in perimeter i (i varies from 1 to p)

Let: $e = f(v)$ be a classification scale, e being $= 1 \dots n$

Let: w_j be a weighting device.

The synthetic indicator of perimeter i will be as follows:

$$S^i = \sum_j w_j f(v_j^i)$$

A numerical example

Let us imagine an area consisting of three catchemnt perimeters P_1, P_2, and P_3.
Suppose that we have adopted two indicators:
pupil/teacher ratio: I_1
admission rate to elementary school at 7 years of age: I_2

The value of these indicators will be given by the following table:

	P_1	P_2	P_3
I_1	15	25	30
I_2 (%)	50	50	75

For the function $e = f(v)$:

e^v	I_1	I_2
1	$\leqslant 20$	$\leqslant 40$
2	from 20 to 25	from 40 to 50
3	from 25 to 30	from 50 to 60
4	> 30	> 60

Adopting the equal weighting $w1 = w2 = 1/2$, we get

$S^1 = 1.5$ $S^2 = 2$ and $S^3 = 3.5$

It might be said that with $S^i < 2$ the situation in connection with the provision of schooling is bad, with $2 \leqslant S^i < 3$, the situation is poor; with $3 \leqslant S^i < 4$, the situation is fair and with $4 \leqslant S^i$ the situation is good.

The aim of diagnosis is to reveal any possible 'anomalies' affecting the school map during the base-year, and to determine the possibilities of rationalizing the stock of schools.

Making a diagnosis requires:

(*a*) *a decision on the statistical units appropriate for the work of analysis (pupil, pupils' group, school, administrative district);*

(*b*) *a decision on parameters or indicators, demographic, educational, environmental, economic, etc.*

Diagnosis generally bears upon pupil enrolments, teaching staff, premises, unit costs and financing.

It is helpful to devise synthetic diagnosis indicators combining the various parameters used and making it possible to classify the anticipated decisions in terms of their nature and urgency.

INVENTORY OF ESTABLISHMENTS

(Ministry of Education, Costa Rica)

MINISTRY OF NATIONAL EDUCATION
SCHOOL BUILDINGS.

Census of pre-school, primary, secondary, higher and teacher-training buildings

PROVINCE ______ CANTON ______ DISTRICT ______ CENTRE ______

REGIONAL ADMINISTRATION ______ CIRCUIT ______ URBAN ☐ RURAL ☐ TELEPHONE ______

NAME OF INSTITUTION OCCUPYING THE BUILDING	Educational level	Number of teachers	Boys	Girls	Mixed	Public	Private	TOTAL ENROLMENT	MAXIMUM CAPACITY PER SESSION	SESSION
1	2	3	4	5	6	7	8	9	10	11
										from to
										from to
										from to

PUBLIC SERVICES		
12		
	Yes	No
Water		
Drains		
Electricity		
Telephone		
No. of floors		
13		

Purchase of land envisaged? Yes ☐ No ☐ Price

New construction envisaged? Yes ☐ No ☐ Price

OBSERVATIONS : ______

14

For official use only		
Requirement:	N.	P.
Teaching accommodation		
Administrative accommodation		
Service accommodation		
Supplementary accommodation		

SANITARY SERVICES	
15	N°
W.C.	
Earth closet	
Urinals	
Lavabos	
Sinks	

16

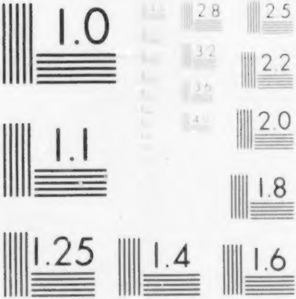
Information supplied by: ______

Confirmed by inspector: ______

DATE

Number of rooms	Interior dimensions Length and width in metres	Area	Building material			Capacity	Condition G(good) A(adequate) P(poor)	Year of construction
			Floors	Walls	Ceilings			
17	18	19	20	21	22	23	24	25
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Laboratories								
1								
2								
3								
Workshops								
1								
2								
3								
4								
Administration								
Secretarial								
Library								
Assembly hall								
Gymnasium								
Dining room and kitchen								
Cellar								
Others								

If this sheet is insufficient a second sheet may be used.


1.0
2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

IX. Estimating schooling requirements

When the diagnosis of the school map for the base year is completed, proposals may be made for rationalizing the supply of education on the assumption that the 'demand' for education is constant. In practice, however, this 'demand' varies, and before proposals for implementing the school map of the future are put forward it is necessary to examine the question of how requirements in the matter of provision of education will develop over the planning period. This problem is the subject of the present chapter. A first section is devoted to defining the purposes behind the provision of education and a second deals with methods of estimating the number of those to be given schooling.

A. The purposes behind the provision of schooling

The decision as to purposes is essentially a political matter, and one which dictates the characteristics of an education plan. Among the factors influencing such a decision one finds:

(a) the principle of democratization of education and the need to ensure 'a minimum of free and compulsory education' for all;

(b) the economy's requirements in respect of skilled manpower, the training of which is plainly a matter involving the school system;

(c) pressures from families for expansion of education;

(d) the amount of resources which the government can allot to education, bearing in mind the need for similar action on the part of the State in other sectors (health, housing, road networks, etc.).

The criteria for deciding on the national purposes behind the provision of education are consequently of a very varied nature, including yield rates, social demand, manpower requirements, limitations on financing, etc. A large number of works deal with the problems raised by the adoption of one or other of these criteria. These problems do not directly involve those responsible for the school map and are not of immediate interest. In most cases, those who draw up the school map have, at least initially, to take over the purposes of the education plan as they stand. However, they may reserve the right to make clear, for instance, how unrealistic these purposes are, if that is indeed the case, and can approach the departments responsible for the Plan with proposals for amendments. In countries lacking education plans it will be necessary to establish a set of assumptions, as reasonable as possible, possibly based on an extrapolation of past trends and/or on special investigations of skilled manpower training requirements.

At this point, a distinction should be made between general education and specialized education, and between compulsory schooling and optional schooling.

(a) In theory, compulsory schooling does not lead to any particular difficulties, since the participation rate has to be 100 per cent in all parts of the country. In actual fact the situation is not always so simple, and it may be that the target of universal education cannot be attained for some decades, as is the case in certain countries; the best to be hoped for over a period of five to ten years, i.e. the space of one or two five-year plans, is to increase the participation rate in primary schools by a few percentage points, from 50 to 60 per cent for instance. Since national rate represents an *average*, it embraces widely varying situations ranging from the capital, with a very high rate close to 100 per cent, to rural areas, with very low rates of around 10 or 20 per cent. Consequently, there is a clear need to interpret this target at regional, school district and commune level. One effective criterion for this work of 'interpretation' is that of levelling up participation rates throughout the various administrative divisions of the country. The most backward catchment areas would, accordingly, be those chosen to enjoy the fastest rates for expansion in the provision of education, and one can also envisage the possibility of a number of variants determined in function of differences between the national and regional situations. As an illustration, Table 25 shows how in the Kaski region in Nepal participation rates are changing in the various recruitment perimeters, with the *average* rate going up from 60.4 to 73 per cent between 1971 and 1981, and the percentage of girls getting schooling going up from 19.8 per cent to 33.2 per cent.

As Table 25 shows, the more backward the area is in 1971, the more progress

TABLE 25. Targets for provision of education by catchment area in Nepal

	1971		1981	
Areas	Participation rate	% girls	Participation rate	% girls
A	112.1	37.1	95	45
B	62.1	19.9	70	30
C	57.1	13.8	68	26
D	69.6	31.5	77	37
E	54.7	17.8	70	30
F	48.8	15.9	68	33
G	63.9	28.9	77	40
H	63.4	26.5	77	38
I	47.7	15.8	68	31
J	42.0	14.5	68	30
K	42.3	12.0	64	25
L	40.3	11.4	64	23
M	31.9	9.1	64	26
N	37.8	5.1	64	25
O	60.5	28.4	73	37
Whole district	60.4	19.8	73	33.2

will have been made in the provision of education. Variations from the average level tend to diminish over the decade.

No method is available for deciding on the coefficients for reducing inequalities in levels and conditions of schooling as between different geographical areas. Such decisions are not merely political; they have to be realistic in the sense that they can be implemented in the course of the period covered by the plan; frequently obstacles have to be removed before the decisions in question can become realities, and this involves a loss of time which must also be taken into account. Here are two examples:

(i) The provision of education in certain geographical areas in Iran, Afghanistan, Nepal, etc., is dependent on the building of a large road network and the regrouping of a number of isolated pockets of population. A decision on the coefficients for the reduction of variations above and below the norm has to take into account the time needed for the realization of these preliminary measures.

(ii) Providing education for girls in certain countries is dependent on the incorporation of women into the teaching staff; this necessarily involves a considerable lapse of time, and cannot be underestimated when the coefficients are being decided on.

However, it is possible to test various coefficients for reduction of inequalities by means of a set of 'variants'.

Variant No. 1: Levelling-out of rates as between the regions.

Variant No. 2: Reduction of those variations from the mean which are inversely proportionate to the situation in the base year, the maximum variation being reduced by half, for instance, or so as to match the average amount of reduction during the period covered by the plan (Figure 17, A).

Variant No. 3: Homothetic reductions of variations from the mean (Figure 17, B) in the most backward areas.

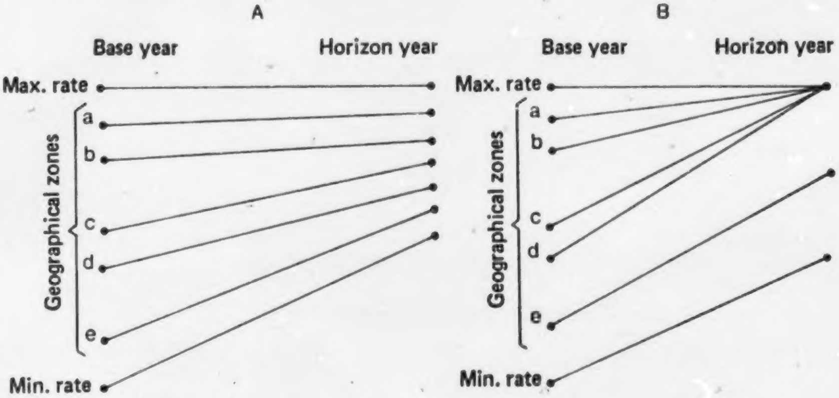


FIGURE 17. *Methods of reduction of variations from the mean.*

Numerical example. Table 26 illustrates a method of reducing variations from the mean by regionalizing an evolution of the targets (rate of provision of schooling in base year being 41, and in horizon-year 50).

TABLE 26. Reduction of variations from the mean

Area	Rate	Variations from mean	Variations from mean as planned[1]	Rates as planned
a	60	0	0	60
b	30	−30	−15.8	44
c	40	−20	−10.5	50
d	15	−45	−23.7	36
e	35	−25	−13.2	47
Total	41	−19	−10.0[2]	50

1. Variations from mean as planned = variations from mean in base year $\times \frac{10}{19}$.
2. —10 = (50—60).

As a result of following this method, the maximum rate is kept constant and the variations from the mean are reduced proportionately to the average reduction, i.e. 10/19ths. This is the simplest course to follow as it does not specifically demand that the weighting coefficients for each geographical area (variant No. 3) form a part of the calculations. It also has the advantage of not requiring any reduction of the rate for area 'a' from 60 to 50 per cent (variant No. 1). However, there is no guarantee that the planned rates calculated in this manner will be realistic and they should accordingly be tested against the school map.

(b) The situation differs greatly in the case of optional schooling,[1] which is often characterized by a number of specialized streams. Here, it becomes essential to select geographical areas of sufficient size so as to cover as complete a set as possible of such streams. Steps should also be taken to arrange for at least a minimum of levelling-out of the conditions of supply (type of school, specialized courses available), apart from a few very specialized courses which can only be mapped nationally. In this connection, it is useful to distinguish[2] between:

(1) A map of *schools,*
(2) A map showing the *types of schooling* available in each district,
(3) A map showing the basic school *districts,*
(4) A map showing *schools for handicapped children,*
(5) A map showing *specialized* vocational *courses,*
(6) A map of the *languages* spoken in the region,
(7) A *boarding-schools* map,
(8) A map showing *preparatory courses* for entry into the highest university-standard specialized schools,
(9) A map showing *courses for higher-grade technicans* and the *technological university colleges.*

The making of maps of types (4) to (9) etc. must concern only very extensive geographical areas. Among criteria for the regionalization of targets, one may mention:

(a) the economic complexion of the regions—Maps (5), (8) and (9).

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[1] i.e., after compulsory schooling.
[2] This is based on what is being done in France.

(b) the geographical character of the regions; whether, for instance, one is dealing with a frontier region (6), or a mountainous area involving difficulties of access (7).

(c) levelling-out of conditions of supply (the map of schools for handicapped children).

As against this, the making of maps of types (1) to (3) can be left to those in charge of the basic school districts, the regionalization of targets calling for the same criteria as in the case of compulsory education, namely the levelling-out of the prevailing situations as between regions. Some districts are backward, others are ahead of the norm. Some schools have to be brought up to standard, and others remodelled in the light of whether they provide more, or less, than is called for in the Plan.

What is being done in France is interesting in this regard. In addition to the breakdown of enrolments in the second cycle of second level (long or short courses), the Ministry of Education has broken down enrolments as between the various specialized streams, thereby creating a situation in which each *département* may vary the allotted percentages in the light of local conditions. Thus, a block of a hundred pupils going on to long and short second-cycle courses exhibited the characteristics shown in Tables 27 and 28.

TABLE 27. Second level, second cycle long course, France

Intake as percentage of total enrolment	Courses leading to	Breakdown of column 1	Permissible ranges
42%	Baccalauréats A, C & D	47%	42% to 52%
	Baccalauréats E[1], BTn & BT (industry side)	23%	21% to 25%
	Baccalauréats B[2], BTn & BT (service industries side)	30%	27% to 33%
		100%	The total to come to 100%

1. Out of the figure of 23%, baccalauréat E accounts for 3%.
2. Out of the figure of 30%, baccalauréat B accounts for 10%.

TABLE 28. Second level, second cycle short course, France

Intake as percentage of total enrolment	Courses leading to	Breakdown of column 1	Permissible ranges
48%	BEP and CAP (industry side)	60%	55% to 65%
	BEP and CAP (service industries side)	40%	35% to 45%
		100%	The total to come to 100%

Attention is called to the relatively generous spread of permissible outside figures in column 4; the national targets may be 'interpreted' by the *département* authorities, provided they remain inside the limits laid down by the Ministry of Education, both for each specialized stream, and overall.

B. Methods of estimating school enrolment numbers

Demographic data are the basis of any projection of enrolment figures, particularly in the case of primary schooling, as is shown by Figure 18.

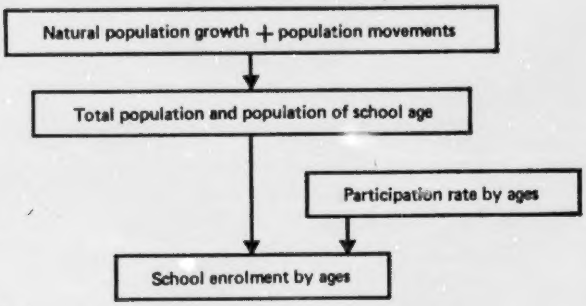
Natural population growth + population movements
Total population and population of school age
Participation rate by ages
School enrolment by ages

FIGURE 18. *Projection of enrolments*

Demographic data are seldom available for individual school districts. Moreover, in the projection of demographic data a number of corrections have to be made to take stock of non-coincident boundaries of administrative and school districts and population movements.

(*a*) *Adjustments called for by disparities between administrative and school districts*

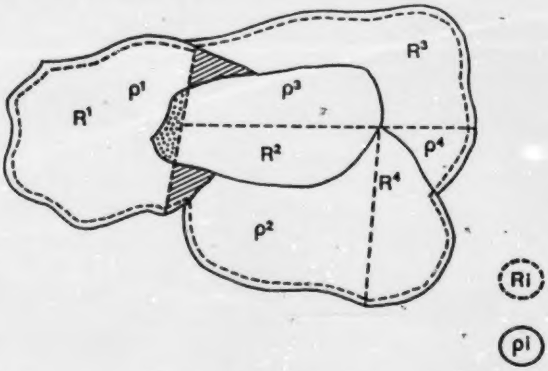
R^3
ρ^1
R^1
ρ^3
R^2
ρ^4
R^4
ρ^2
Ri
ρi

FIGURE 19. *Disparities between administrative and school districts*

R being administrative districts and p school districts, demographic data p^1 are arrived at on the basis of those for R^1 with a number of adjustments such as the following:

population of p^1 = population of R^1 − population of hatched areas + population of the speckled part of R^2

Sometimes census figures are sufficiently detailed to permit calculations to be made, but it may also happen that perimeters astride two administrative districts are too small for the census or electoral rolls to provide the necessary information. Where this is so, one may either assume that the population of the smallest statistical unit for census purposes is equally divided between the two contiguous districts, as was done in the case of the study made of County Sligo in Ireland, or else refer to the very detailed staff maps and divide up the population on the lines of the number of dwelling places in the two districts in question, as was done in the case of the study made of the San Ramón district in Costa Rica.

It should be noted that adjustments of this kind are actually only necessary at the time of preparation of the primary-school map. Where other levels are concerned, the small number of people at stake does not necessitate recourse to adjustments; in any case, the consequences of these for the exactitude of estimates of population of school age can well be merely marginal.

(*b*) *Population movements*

No illusions should be entertained as to the existence of a detailed analysis of population movements for individual administrative or school districts; in any case, if such data could be found and were to be of use, they would have to include age distinctions for children of school age, and be regularly kept up-to-date. Experience shows that, apart from a few specific enquiries made in connection with particular investigations, e.g. of the labour market, and information obtainable by comparing resident population data between two census dates, there are no data on population movements, either as a whole, or still less with age breakdown.

Furthermore, the very notion of population movements raises questions of definition. Frequently, a migrant is defined as one whose main address on date t^0 is different from his address on date t^1. This disregards population movements between t^0 and t^1 and also the *number* of times people have moved from one place to another between the two dates. The further t^1 is from t^0 (and this is often a period of time between two census dates), the less exact are the data gathered.

When population movements are being analyzed, two indices are generally taken into consideration: (i) the ratio of net population movements into and out of an area to the total population of the same area, and (ii) the ratio between those leaving plus those coming in, and total population. As an illustration, Table 29 shows the evolution of population movements in 1960–61 and 1965–66 between Merseyside, the remainder of North-West England, and the whole of England and Wales. In order to project the numbers of those of school age, we should theoretically have the same data with age breakdown.

In practice one assumes, erroneously, that the breakdown of the balance of population movements by ages will be identical with that for the total population

TABLE 29. Population movements between Merseyside, its hinterland and the rest of England

Migration from		Migration to Merseyside 60/61	 Merseyside 65/66	 Hinterland 60/61	 Hinterland 65/66	 Rest of England 60/61	 Rest of England 65/66	 Total 60/61	 Total 65/66
Merseyside	60/61	—		14 140		13 130		27 270	
	65/66		—		20 600		12 360		32 960
Hinterland	60/61	7 320		—		52 850		60 170	
	65/66		8 120		—		56 760		64 880
Rest of England	60/61	9 200		46 280		—		55 480	
	65/66		10 040		53 770		—		63 810
Total	60/61	16 520		60 420		65 980		142 920	
	65/66		18 160		74 370		69 120		1 61 650
Net balance:			*1960/61*		*1965/66*				
Merseyside			10 750		14 800				
Hinterland			250		9 490				
Rest of England			10 500		5 310				

SOURCE Ian Masser, Analytical models for urban and regional planning.

of the geographical area being investigated or, if such detailed data are not available, with that of the smallest geographical area, including the school district.

(*c*) *Projecting number of children of school age*

There is no general formula for use in every country, but the principle of projection is simple to understand and apply.

(1) In the first stage, one leaves aside any question of correcting the boundaries of school districts, and any question of population movements. If the number of years of the school cycle (primary or secondary) is *n* (5, 6, 7 or 8 years), a calculation has to be made of the numbers resulting from *n* generations of children; if the horizon year is t_h and *d* is the official age for beginning a cycle lasting *n* years, then calculations must specify the total of births taking place in the district between year $t_h - d_{n-1}$ and $t_h - d$. It is clear that children born in year $t_h - d$ will be aged *d* in horizon year t_h and the children born during year $t_h - d_{n+1}$ will be aged $d + n$; in other words, will have reached the official age for terminating the cycle; the others correspond to intermediate year-courses.

Let us take a concrete example with numbers. Let us suppose that we wish to make an estimate of the number of children of school age in the four-year second-level first cycle. If the age for starting school is 6 and the duration of the primary-schooling period is 5 years, the age for beginning the first cycle will be 11. If we are projecting for the year 1980, children born in 1969 (who will be 11 in 1980) are theoretically those concerned by the first year of the first cycle; those born in 1968 will be those of the second year, those born in 1967 will be those of the third year and those born in 1966 will be those of the fourth year. We have, therefore, to add together the births occurring between 1966 (i.e. 1980−11−4+1) and 1969 (i.e. 1980−11).

Information about births can be obtained by making comparisons of population censuses, or from the registers of births and deaths. In France, for instance, a comparison of census figures for 1954 and 1962 made it possible to calculate *r* (i.e., number of births in a given area) while the population of school age in the first cycle in 1970 was estimated at *r*/2 (4 years), subject to subsequent adjustment.

If information on births is taken from registers for births and deaths, survival tables have also to be used. In other words, the survival rates have to be applied to each year of age of the population under consideration.

It may happen that some of the children due for schooling in the horizon-year have not yet been born; in that case, projections have to be made of births over a number of years. Ideally, this calculation should be based on trends in the age structure of the female side of the population and on reproduction rates, also by ages. In practice, given the relative stability of reproduction rates and the relatively short period for which projections are required, it suffices to extrapolate the trends and keep an eye on the way the number of births has evolved during recent years.

Whatever the method followed, a calculation must be made of the number of survivors. This means using survival rates. For instance, let 1,000, 1,050, 1,090 and 1,120 be the numbers of births in the years 1970 to 1973. We need to project enrolments for 1985 (children between 12 and 15). If the survival rates are:

0.975 at the age of 12,
0.974 at the age of 13,
0.974 at the age of 14,
0.972 at the age of 15,

the age-group for schooling will be

$$(0.975\times 1{,}120+0.974\times 1{,}090+0.974\times 1{,}050+0.972\times 1.000) = 4{,}030 \text{ children}$$

In many countries, no reliable and complete data on mortality are available for calculating survival rates. Where this is the case, standard mortality tables must be consulted. The best known are those drawn up by the Population Division of the United Nations; these give the number of survivors at various ages, and make it possible to calculate survival rates. The survival rate at a given age is, of course, nothing more than the proportion of population of that age on a given date which will survive to a year later.

(2) Once the numbers of those of school-age in the relevant age-group in the census area have been calculated, and the numbers for the catchment perimeter and for the whole of the administrative district in question have been totalled, it then becomes necessary to make a number of adjustments.

(i) The differences of boundaries are dealt with as follows. If *a* is the number of those of school-age in the age-group in the administrative district, the numbers of those in the school district is calculated by means of the following formula (which, it may be mentioned, is applicable to each catchment perimeter):

$$a\left\{1+\left(\begin{matrix}\Sigma\\ \mathrm{i}\end{matrix}\right)\frac{x_i}{p}-\left(\begin{matrix}\Sigma\\ \mathrm{j}\end{matrix}\right)\frac{y_j}{p}\right\}=b$$

where x_i represents the total population of area i not falling within the administrative district, but falling within the school district; y_j represents the total population of area j falling within the administrative district, but not falling within the school district; p represents the total population of the administrative district.

(ii) The results of population movements are dealt with as follows. Let m represent the balance of population movements in and out of the administrative district over a period of a year; m may be positive or negative, according as the area is gaining or losing inhabitants as a result of population movements. The value of m may be estimated on the basis of past trends by comparing the figures of the last two censuses, for instance, or by drawing on information obtained as the result of specific investigations into movements of population. However, one must also keep an eye on the district's development prospects, drawing on information from regional development plans, from town-and-country-planning authorities, and other specialized sources. In spite of this it is likely that the estimate made of m will not be very precise.

Whatever the outcome, the adjusted figure for school-age children in the whole of the area is given by the formula:

$$c = b\left(1+\frac{\mathrm{m}}{\mathrm{p}}\right)^{\mathrm{d}} \neq b\left(1+d\frac{\mathrm{m}}{\mathrm{p}}\right)$$

d being the number of years between base-year and target-year.

For the purpose of drawing up the school map, three types of population movement are of interest: (i) movement from outside the area into a catchment area and vice-versa; (ii) movement from one catchment area to another; and (iii) movement inside a catchment area. When the calculation of *c* has been made, the result has to be divided up between the catchment areas. In view, however, of the fragmentary nature of the information available on population movements and the specificity of the various areas, it is not possible to propose a generally applicable method for dividing up the figure reached for *c*. It has to be done empirically on the basis of the information available.

(iii) Finally, it is advisable when estimates are being made to take account of the handicapped portion of the school-age population. The average figure is put at between 5 and 10 per cent. On the assumption that it is 7 per cent, the figure arrived at for *c* has to be reduced by that percentage, with the result that the school-age population then becomes 0.93*c*. The same coefficient can, of course, be applied to all catchment areas in the administrative district.

(*d*) *Projecting enrolment figures*

A number of works deal with methods of projecting enrolments.[1] It will suffice in the present context to recall the general principles involved and to note the different stages in the work of projection.

(*i*) *The general principles.* Where it is necessary to project enrolment figures for a given target year, the starting-point can be constituted by present enrolments and anticipated future admissions, and the projections can be based on average rates of promotion, repeats and drop-outs, and rates of transfer from one level to the next. These are relatively long projections inasmuch as they require a full projection of numbers over successive years right up to the target year.

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[1] The reader is referred to the works of Ta Ngoc Châu and J. D. Chesswas mentioned at the beginning of Part B (page 129, note 1).

Projection work may be simplified by taking retention rates which permit one to go directly from new admissions during previous years to the number for a given year. Thus, with primary schooling lasting six years, and the maximum repeater figure being two, enrolment numbers in primary school in a given year are a function of the new admissions over the eight preceding years.

Retention rates may be defined as the proportion of pupils admitted in a given year and still at school after one year, after two years . . . after *n* years.

A direct estimate of retention rates can be made if detailed statistics exist for enrolments in the various classes, with a breakdown of the number of repeaters over the period of schooling in question. In the light of the class followed and the number of repeaters, pupils can be identified according to their year of admission into the system. On this basis, an estimate may be made of the retention rate for each of the groups of pupils successively admitted (see Table 30).

TABLE 30. Breakdown of enrolment by (annual) classes and number of repeaters throughout the school programme

Total number of repeaters over the school programme	Annual class					
	I	II	III	IV	V	VI
0	E_0^1	E_0^2	E_0^3	E_0^4	E_0^5	E_0^6
1	E_1^1	E_1^2	E_1^3	E_1^4	E_1^5	E_1^6
2	E_2^1	E_2^2	E_2^3	E_2^4	E_2^5	E_2^6
3	E_3^1	E_3^2	E_3^3	E_3^4	E_3^5	E_3^6

If the data given in the table are in respect of year *t*, it will be seen at once that E_0^6, E_1^5, E_2^4, E_3^3 all relate to admissions during year t–5, and the retention rate after 5 school years is equivalent to:

$$b_5 = \frac{E_0^6+E_1^5+E_2^4+E_3^3}{A_{t-5}}$$

If no data are available concerning the total number of repeaters throughout the schooling period, a notional cohort of pupils can be formed on the basis of average promotion, repeater and drop-out rates. It is important to realize that if this is done, what is being used are *average* rates for the various classes and not *actual* rates relating to a given set of pupils. The result of this is that the retention rates arrived at are not an exact reflection of the true state of affairs.

In any case, when projections of future enrolments are being made, the rates used are not the rates as noted in the past, but prospective rates. The assumptions to be made about the level of these prospective rates depend on the nature of the policy proposed for repeats and drop-outs and on the efficacy of the steps taken to put the policy into effect.

(*ii*) *The stages*

(a) *Primary schooling*

—calculation of admissions (in the light of goals adopted);

- —application of retention and repeater rates to the admission figures;
- —calculation of total enrolment and enrolment by class.

(b) *Middle and secondary schools*[1]

- —calculation of rates of promotion from primary schooling to first year of middle or/and secondary schools;
- —estimation of enrolment numbers in first year of middle and secondary school;
- —utilization of retention rates to estimate total enrolment and enrolment by class;
- —utilization of target rates for admission to the various streams to estimate enrolment figures for first year of optional courses;
- —utilization of promotion and repeater rates to calculate enrolment figures for each class in the various streams.

By way of illustration, the outline tables 31–33, taken from the Costa Rica study, show the successive calculations made for each catchment area.

TABLE 31. Primary education enrolment estimates for 1977 and 1980

1977 enrolment

Age	Population	Enrolment ratios	Enrolment
6			
7			
8			
9			
10			
11			
Total			

1980 enrolment

Age	Population	Enrolment ratios	Enrolment
6			
7			
8			
9			
10			
11			
Total			

---

[1] The same will apply to vocational and technical education.

TABLE 32. Cycle III enrolment estimates in 1977[1]

		Grade I	Grade II	Grade III	Grade IV	Grade V	Grade VI	Transition rate	Grade VII	Grade VIII	Grade IX
1972											
1973[2]	R										
	P	——	——	——	——	——	——	——	——	——	——
	T										
1974	R										
	P	——	——	——	——	——	——	——	——	——	——
	T										
1975	R										
	P	——	——	——	——	——	——	——	——	——	——
	T										
1976	R										
	P	——	——	——	——	——	——	——	——	——	——
	T										
1977	R										
	P	——	——	——	——	——	——	——	——	——	——
	T										

1. Grades VII, VIII & IX.
2. R = Repeaters
   P = Promoted
   T = Total.

TABLE 33. Estimates of Cycle III enrolments in 1980

Estimates of apparent enrolment ratios

Year	Grade VI	Transition ratio	Grade VII	Grade VIII	Grade IX
1977					
1978					
1979					
1980					

Projection of cycle III enrolments in 1980

Age	Population	Apparent enrolment ratios	Enrolments	Corresponding grade
12				VII
13				VIII
14				IX

Projected enrolments during the period of compulsory schooling are a direct function of population figures, i.e. the numbers in age-groups due for schooling, and of the system's retention rates, based on figures for those repeating, and those promoted.

When it comes to the optional-schooling period, projections of enrolment are also influenced by what the Plan is aiming at, and how this is interpreted at the level of each area.

Estimates need to be adjusted to render account of divergences between the boundaries of administrative areas and school districts, population movements, the part played by the private sector and the proportion of handicapped children.

X. Drawing up proposals

The results of the diagnosis of the base-year school map and estimates of schooling requirements make it possible to draw up for each area a 'supply-and-demand balance-sheet' and to calculate 'surpluses' and 'shortages' of pupil-places. Drawing up these balance-sheets is an essential part of the work on the future school map.

1. The supply-and-demand balance sheet

An examination of the situation affecting premises during the base year will lead to conclusions on whether they are to be closed, kept on, or expanded. Such conclusions will require adjustment to take account of:

(a) any possible changes in the structure of the schools system; this is the case, for instance, where five-class primary schools of a '5–6' system are being transformed into a '3–7' system, as in Nepal;

(b) the date of building of the schools—some schools are too recent to be shut down quickly;

(c) any possible changes in the standards in force; for instance, the elimination of one-teacher schools;

(d) reforms affecting content and curricula, such as the flexible use of a third part of school hours at local option, or introduction of pre-vocational training, or the elimination of the teaching of history, geography, and so on;

(e) any modification in the organization of supply, such as bringing in 'nuclearization', doing away with boarding establishments, or a unification of the schools system leading to nationalization of the private sector, etc.;

(f) the target year; 'prefabricated' premises do not last for ever; certain 'hard-built' premises, even of very recent date, may be ill-adapted and have to be completely or wholly remodelled in the short, medium, or long term.

The results of the analyses will indicate the number of pupil-places in schools at the time of the target year. Table 34, which is taken from the school-map study of the Zahlé region in Lebanon, illustrates the position numerically.

Comparing the number of pupil places available, and the number of places required per catchment perimeter (and *not* per school), it becomes possible to draw up net balance-sheets by perimeter for the short, medium and long term respectively. Once these balance-sheets have been completed, it is possible to put forward proposals concerning the localization of new schools.

TABLE 34. Enrolment capacity of public primary and middle schools in the *caza* of Zahlé

Localities	Enrolment capacities	See note below	Localities	Enrolment capacities	See note below
Ablah	326	0	Riit	266	+79
Ali Nahri	369	0	Sa'adnayel	339	0
Ayn Kfar Zabad	81	+11	Ta'alabaya	325	−30
Barr Elyas	301	+13	Tertel	145	0
Bwarej	94	−2	Twayté	26	−1
Dayr el Ghazal	59	0	Zablé		
Forzol	201	+22	Barbara (Berdawaé)	96	−8
Haret el Fikani	60	−12	Hawsh Omara (boys)	222	0
Hazzerta	280	−14	Hawsh Omara (girls)	175	+27
Jdica	303	−30	Hawsh Zara'ané (Malouf)	140	+15
Kfar Zabad	286	−219	Hawsh Zara'ané (middle)	338	−4
Kusaya	55	0	Midan (girls no. 1)	340	+121
Mejdel Anjar	303	−9	Midan (girls no. 2)	98	0
Maksé	136	0	Midan (Jdita)	288	−23
Mrayjat	77	−13	Midan (boys no. 1)	265	+48
Nabi Ayla	200	+82	Moallaka (M. Sinaiyyé)	203	+59
Nasriyyé	120	+54	Moallaka (boys)	514	+122
Niha	150	+83	Moallaka (girls)	545	+119
Qabb Elyac (girls)	205	+7	Moallaka (Ahdath)	131	0
Qabb Elyac (boys)	270	−20	Rassiyyé (garçons no. 1)	277	−4
Qa er-Rim	304	+55	Saïdat en Najat (Jaret Wadi)	125	+45
Reyyak (primary)	213	+15	Wadi Arayech	375	+124
Reyyak (middle)	322	0			

NOTE —overloaded +free places 0 capacity equal to enrolments.

Requirements		Tenable existing resources		Future resources
↓		↓		↓
number of students to be accommodated	=	existing premises and those in course of construction	=	premises to be built

2. *The techniques for deciding on localities for new schools*

There are several different ways of deciding in each area exactly where new schools should be constructed; one method is to resort to operational research techniques; or again it is possible to do it empirically, by means of a continuous approach procedure, once a number of parameters have been defined.

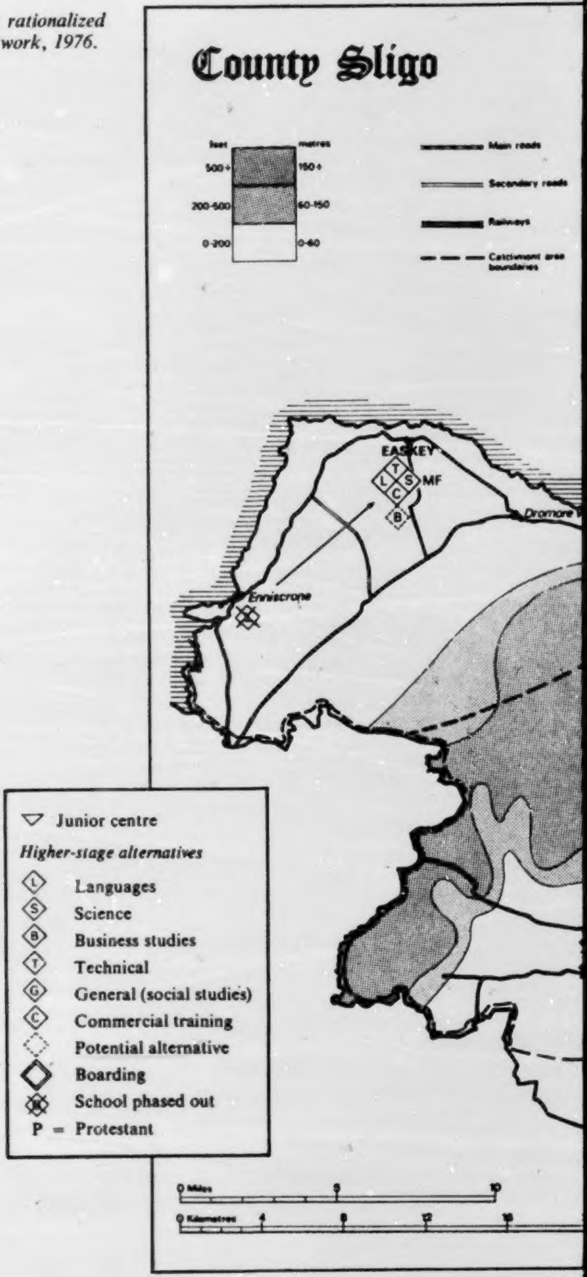
The best operational research technique for solving the problem of location of new schools generally takes the form of a linear programme which seeks to optimize a cost function (cost of transport and boarding establishments and actual cost of education) or a provision of education function (with a guarantee of adequate ethnic mixing in the schools). At the same time due weight is given to a certain number of limitations, e.g. on time from home to school, the existence of a certain number of streams per school and a minimum number of pupil-places, etc. The structure of the programme is close to that of a 'linear transport programme'. With localities fixed and a given number of schools to be built, the model becomes a programme for allotting populations to the various fixed-capacity schools. This is what has happened with a certain number of endeavours of this kind, for instance in the United States and France. However, experience shows that while these mathematical programmes are classical in their nature, as a rule their dimensions considerably exceed those of problems of a similar nature solved to date at acceptable cost levels; in most cases the amount of computer calculating time involved exceeds reasonable limits. Moreover, even when it has been possible to calculate accurately, the 'economic optimum' arrived at is not always acceptable, because putting it into effect would lead to psychological, social or political difficulties.

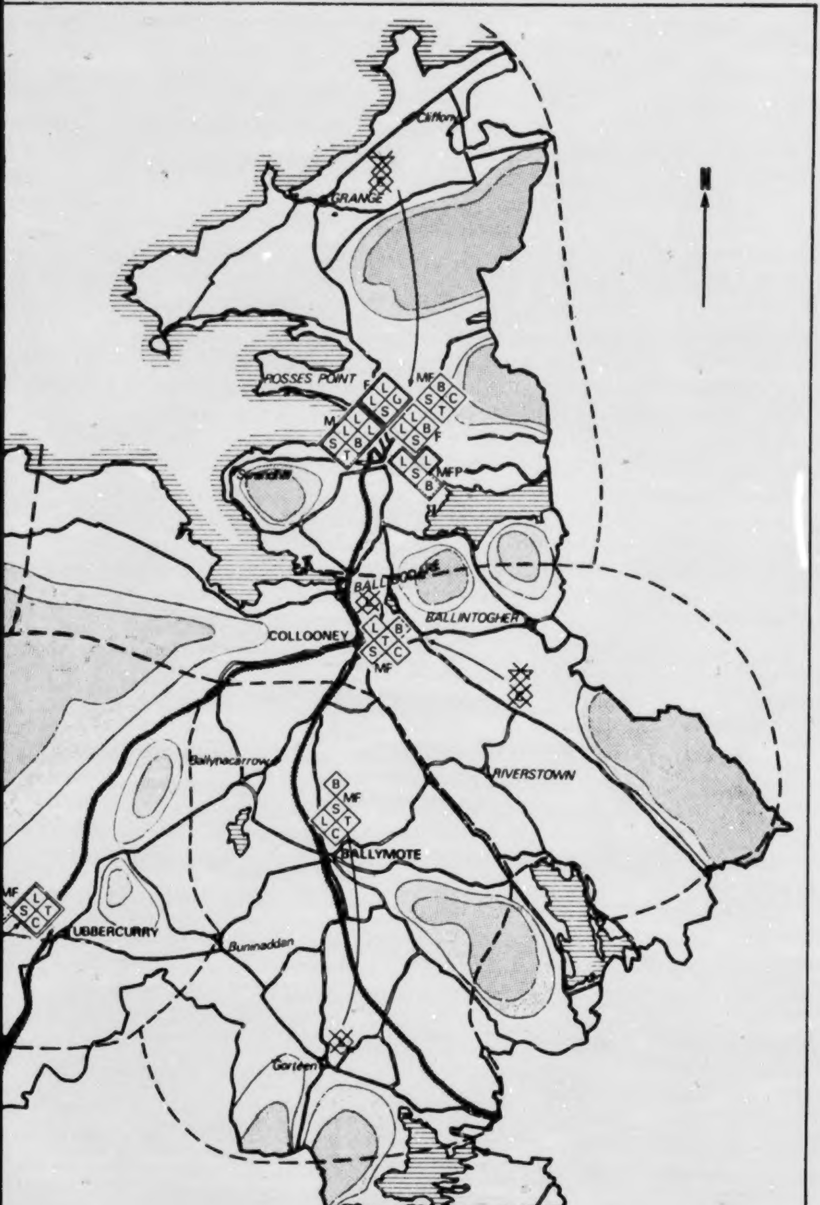
These are among the reasons why we thought it preferable not to take a theoretical model for our investigations, but to proceed empirically rather using a system of continuous approach, and applying a set of criteria from among those available.

(1) In this way, when primary education was being investigated in County Sligo in Ireland a first step was taken by identifying schools with less than 75 pupils that were likely to be closed down or amalgamated, after which a study was made of the prospective trend of enrolments in relation to those of the 1966–71 period, the age and condition of premises and physical facilities were reviewed and the possibilities of enlarging them investigated. It then became possible to put forward proposals for closing down 40 to 60 per cent of the schools in each catchment area. When it came to the school map for secondary schools, the work was done in two stages. Firstly, an investigation was made of each catchment sector's requirements in the matter of provision of education. As a result of this it was possible to make proposals for schools at the (demographic) 'centres of gravity' of each sector, specifying the types of schools, in conformity with size standards for each category of school and each sector's maximum requirements in the matter of provision of education. In a second stage, the ideal map so arrived at was compared with the existing school map (1971), after which definitive proposals were put forward including one for dividing the county up into new catchment perimeters (see Map 29).

(2) Different empirical procedures for making proposals were resorted to in the Ankole district in Uganda. For primary education, a distinction was made between areas with a population density superior to 100 inhabitants per square kilometre (which probably enjoy a complete range of well-equipped, co-educational schools and only require the allocation of pupils to the existing stock of schools to be better organized); areas with a medium population density of 40 to 100 inhabitants per square kilometre (probably provided with whole-scale primary schools, but also containing some private schools which need to be either closed down or amalgamated—a step which can give rise to problems of a political nature in the localities affected), and areas of low population density with less than 40 inhabitants per square kilometre (where varied solutions are required with a combination of biennal recruitment, boarding establishments, school transport and 'temporary residence'). For secondary schooling, the prospective map is drawn up in the light of the following criteria: replacement of boarding facilities by a system of school transport, and setting up of new schools at important cross-roads of the district road-system so that many pupils can be transported without difficulty.

MAP 29. *County Sligo, Ireland: rationalized second-level school network, 1976.*


County Sligo
feet
metres
500+
150+
200-500
60-150
0-200
0-60
Main roads
Secondary roads
Railways
Catchment area boundaries
EASKEY
T
L
S
C
B
MF
Dromore W
Enniscrone
Junior centre
Higher-stage alternatives
Languages
Science
Business studies
Technical
General (social studies)
Commercial training
Potential alternative
Boarding
School phased out
P = Protestant
0 Miles
5
10
0 Kilometres
4
8
12
16


N
Cliffony
GRANGE
ROSSES POINT
MF
M
F
MFP
Strandhill
BALLISODARE
BALLINTOGHER
COLLOONEY
MF
Ballynacarrow
RIVERSTOWN
MF
BALLYMOTE
MF
TUBBERCURRY
Bunnaddan
Gorteen

(3) When the primary-education school map was being investigated in the Ivory Coast, work on the formulation of proposals fell into three stages. Firstly, a distinction was made between those areas where a system of teaching by television was to be introduced and those not to be covered by the broadcast retransmission network. Secondly, in each rural section (these consisting of a number of villages) the only catchment parameters identified were those which had a sufficient number of primary schoolchildren to sustain at least three classes by the 1981 target-year. In the third stage, the most highly populated localities in each perimeter and those situated on a major road were selected for the setting-up of schools. As finally proposed, the school map takes account both of premises existing in 1973, and of localities chosen for new schools.

(4) When work was being done on the school map for the Aurich area of the Federal Republic of Germany a number of rationalization principles were put to work simultaneously, namely the adoption of the *strukturplan* standards calling for three classes per age-group in first-level schools and the setting-up of school centres with at least six classes per age-group at second level; the setting-up of second-level schools in the first-, second- and third-class 'growth-centres' decided on by the development plan; redelimitation of catchment areas to take account of the size of school centres and the adoption of building units of 55 to 80 square metres for classes of 30 pupils, etc. Two schemes were devised in connexion with the putting forward of proposals, namely H1 involving the completion of educational reform by 1980, and H2 for the partial introduction of the reform's horizontal system by 1980. Application of the rationalization principles and of the two schemes for the introduction of reform measures, together with a survey of premises available, made it possible to elaborate a set of proposals for organizing supply in each of the district's catchment areas (see Maps 10 and 11 in Chapter III).

(5) The prospective school map for Chahroud in Iran was drawn up empirically by means of a continuous approach system. At the outset the situation in each *dehestan* was examined, thereby making it possible:

(a) to identify existing schools to be kept on, enlarged or rebuilt; the criterion for school enlargement was a limit of 45 pupils per class;
(b) to take note of all villages with more than 280 inhabitants lying outside areas covered by existing schools so that schools capable of subsequent development could be set up there as a matter of priority.

In the second stage the additional catchment areas necessitated by the setting-up of schools in villages with more than 280 inhabitants were identified. A list was then made of villages not covered by the catchment areas, and with more than 100 inhabitants, for which schools would have to be provided. In this way, as the result of successive steps, a school network was arrived at which covered the entire areas of each *dehestan*. In the case of villages with 50 to 100 inhabitants, Literacy Corps schools were opted for (with a minimum of 10 pupils).

As a general policy for the area, it was decided to classify schools by size and to organize them in networks comprising central schools (five-class primary schools, serving their localities as well as neighbouring villages, and possessing canteen facilities); satellite schools (with one to three classes) situated within a circle with a maximum radius of 30 kilometres; and finally, isolated schools.

The decision as to central schools is governed both by the size of the schools and by the means of communication; in this case, priority was accorded to existing three-class primary schools.

Separate short-term (Vth Plan) and medium-term (VIth Plan) proposals were put forward, since one of the prior conditions for organizing the network of central and satellite schools proposed by the school map was the completion of the road-building programme envisaged in the Vth Plan, and the amalgamation of small villages with less than 50 inhabitants.

(6) The school-map report on the San Ramón district of Costa Rica proposes that the school map be organized along the following lines:

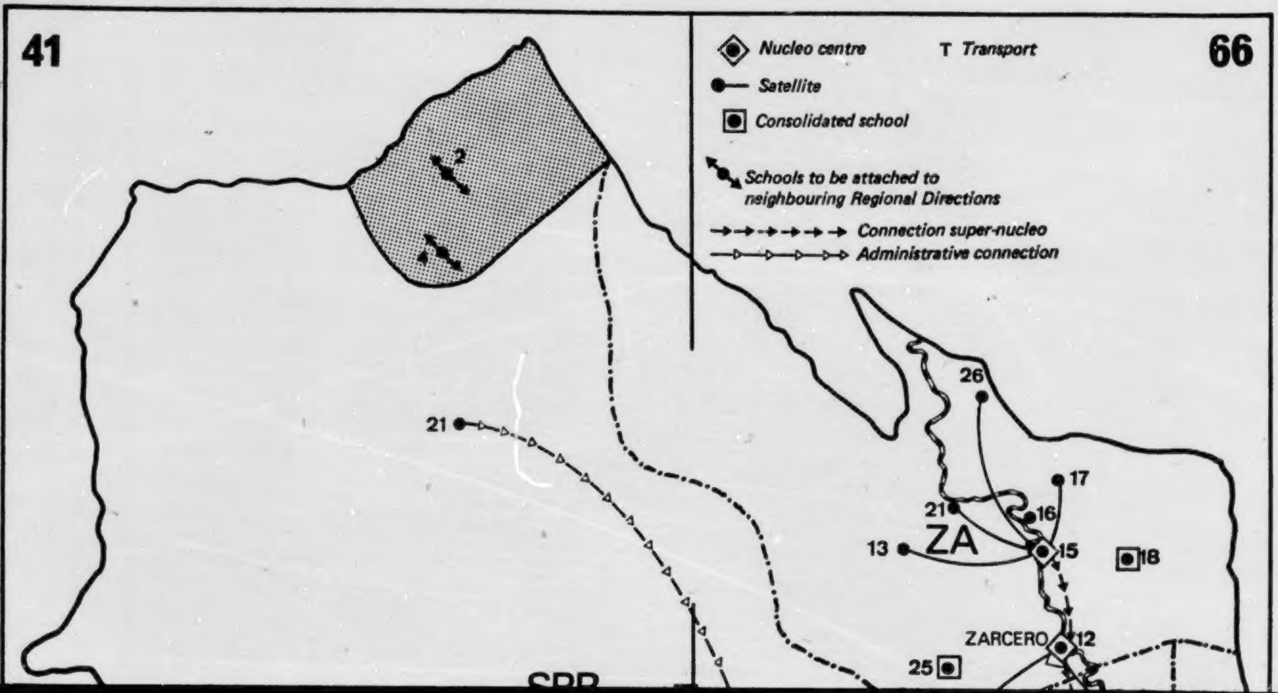
(a) for elementary education, an examination of enrolment trends in existing schools, with a view to identifying schools with too few pupils to justify their being kept in operation, and a regrouping of schools in nucleos with 400 to 800 pupils formed around those primary schools with the largest enrolments and best situated in relation to transportation facilities (see Map 30).

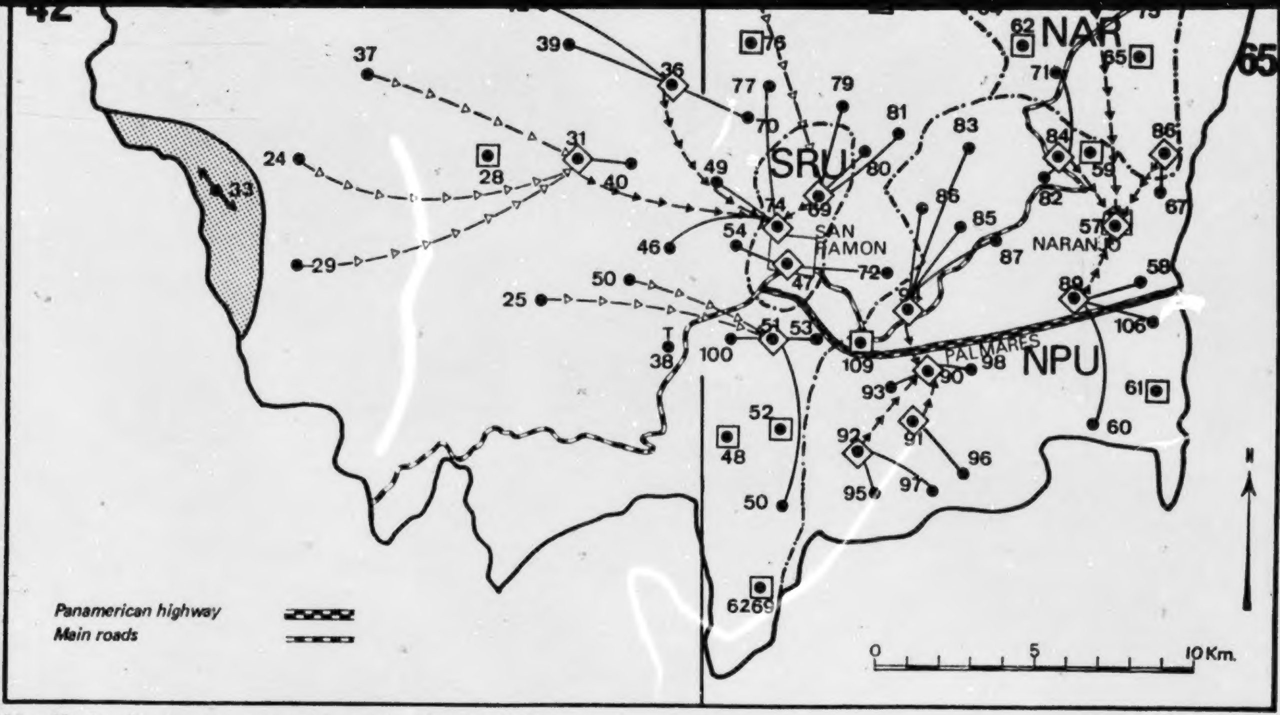
(b) for the middle-school system, location of schools in primary-nucleo centres or, as a variant, in premises of closed-down elementary schools, with organization of middle schools in cycle III nucleos. The centres of these nucleos are located in the chief town of the district and in the other three main towns; these cycle-III nucleo centres embrace schools providing the cycle with optional subjects (i.e. cycle IV).

To sum up, the organization of supply is a function of demographic trends, the state of the road network, and the distribution of inhabited places; in addition, a link-up is arranged between primary-education nucleos with middle-school nucleos and the schools which provide cycle-IV courses. Some schools are still outside the network—either too isolated to become part of a nucleo or too small to provide full-scale elementary education (i.e. cycles I and II). The school map is rounded off with proposals for providing boarding facilities for a certain number of pupils and school transport for others.

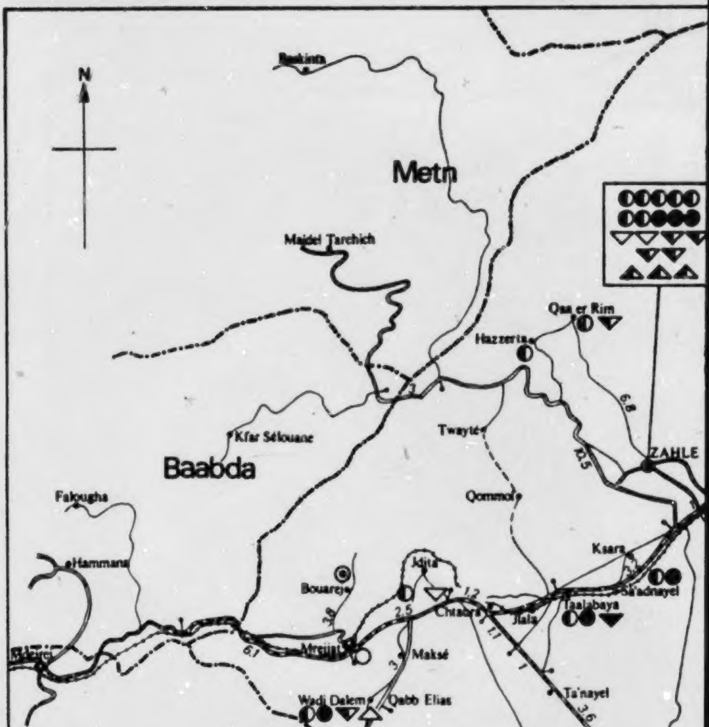
(7) The report on the school map for Morocco deals separately with proposals for new schools in rural areas (in the Gharb Province) and in the urban context (Casablanca). New rural elementary schools in each 'perimeter' are to be set up in the *douars* which are the most densely populated or the best situated in relation to transport possibilities. In urban areas, on the other hand, it is not always possible to 'choose' the location of new schools, because the high cost of land and the shortage of sites in the older parts of the city frequently make it necessary for those in charge of the school map to put up with emergency solutions: building schools with several floors, putting up prefabricated classrooms on the playing-grounds of existing schools, and resorting to the double-shift system.

(8) The work done on the Kaski district in Nepal was also carried out under a continuous approach system. To begin with, an estimate was made of the numbers needed to guarantee satisfactory attendance rates for various schools under the

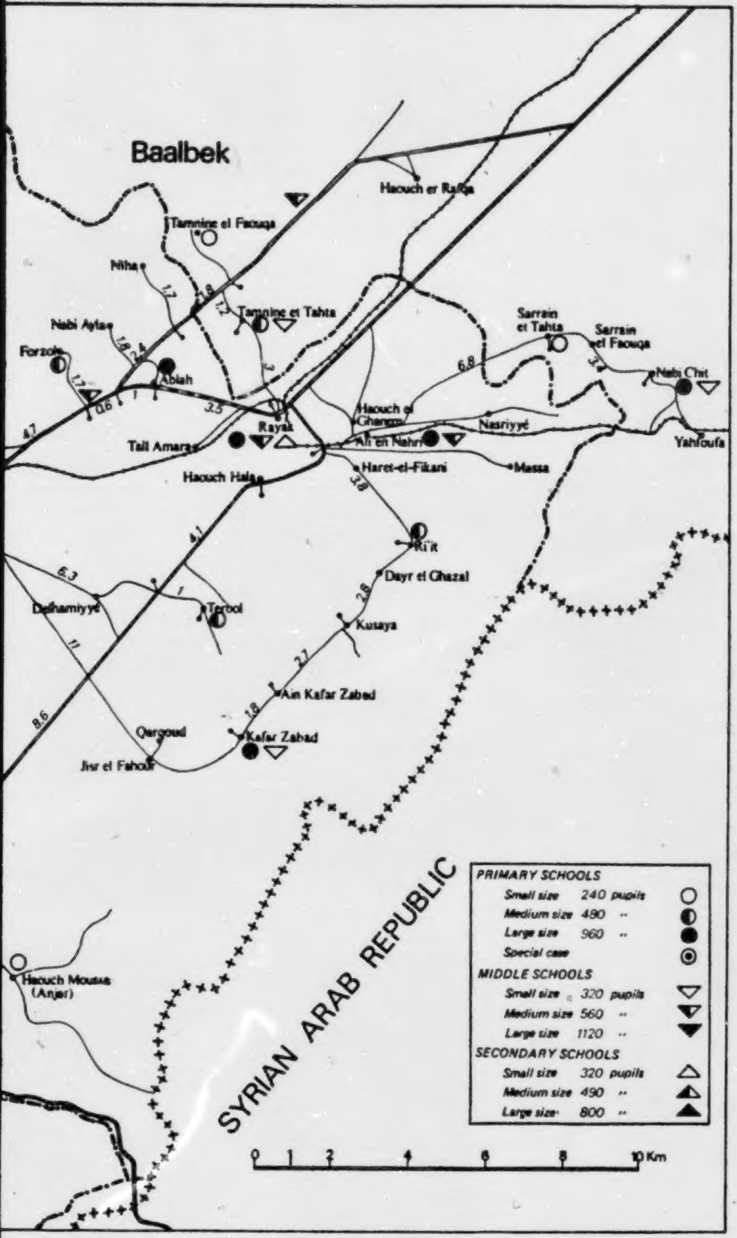

41
66
Nucleo centre
T Transport
Satellite
Consolidated school
Schools to be attached to neighbouring Regional Directions
Connection super-nucleo
Administrative connection
2
21
26
17
21
16
13
ZA
15
18
ZARCERO
12
25
SPR


NAR
SRU
NPU
SAN RAMON
NARANJO
PALMARES
Panamerican highway
Main roads
0
5
10 Km.
N

MAP 30. *San Ramón, Costa Rica: organization of Cycles I and II schools in nucleos.*


N
Baskinta
Metn
Majdel Tarchich
Qaa er Rim
Hazzerta
6.8
10.5
ZAHLE
Twayté
Kfar Sélouane
Baabda
Faloughá
Qommol
Hammana
Ksara
Jdita
Bouarej
1.2
Sa'adnayel
2.5
3.8
Chtaura
Taalabaya
Jlala
6.1
Mreijat
Maksé
1.1
3
Ta'nayel
3.6
Wadi Dalem
Qabb Elias
Aaley
5
Barr Elias
2.6
2
El Marj
3
2.5
Tall Akhdar
2.3
Haouch
el Harrimé
Chouf
Aammiq
Majdel
Aanjar
2.4
Beqaa al Gharbi
Dakwé
es Saw

MAP 23. *Zahlé, Lebanon: the rationalized school network.*


Baalbek
Haouch er Rafqa
Tamnine el Faouqa
Niha
Tamnine et Tahta
Nabi Ayla
Forzol
Ablah
Sarrain et Tahta
Sarrain el Faouqa
Nabi Chit
Yahfoufa
Haouch el Ghenam
Nasriyyé
Rayak
Tall Amara
Ali en Nahri
Haret-el-Fikani
Massa
Haouch Hala
Ri'it
Dayr el Ghazal
Delhamiyye
Terbol
Kusaya
Ain Kafar Zabad
Kafar Zabad
Qargoud
Jisr el Fahour
Haouch Moussa (Anjar)
SYRIAN ARAB REPUBLIC
4.7
0.6
1
1.7
1.8
2.4
1.7
1.8
1.2
3.5
2
6.8
3.1
3.8
4.1
6.3
1
2.8
2.7
1.8
11
8.6
PRIMARY SCHOOLS
Small size 240 pupils ○
Medium size 480 " ◐
Large size 960 " ●
Special case ◉
MIDDLE SCHOOLS
Small size 320 pupils ▽
Medium size 560 "
Large size 1120 " ▼
SECONDARY SCHOOLS
Small size 320 pupils △
Medium size 490 "
Large size 800 " ▲
0 1 2 4 6 8 10 Km

new '3-4-3' system. This made it possible to decide what types of schools were 'viable' in the case of each district area. Next, after the stock of existing schools had been analysed, a number of schemes for using them were put forward; particular attention was given to schools with enrolments under 50, which might continue to have classes 4 and 5 after the reform procedure. In a second stage, a comparison of the existing stock of schools with what was needed made it possible to estimate net requirements, and to proceed to decisions concerning the location of new schools. For the latter purpose, various parameters were taken into consideration, such as topography, means of communication, physical relief, the dialects spoken, etc.

(9) The following considerations underlie school-map proposals for the Zahlé *caza* in Lebanon (see Map 31):

(a) Enrolment in state and private schools, including both subsidized and fee-paying schools. It is the size of enrolments, particularly those of the state schools, that governs the decision on whether a school should be set up or not, and what size it should be. Where enrolment in a given locality is not large enough to justify a small-size school at least, pupils from one or more neighbouring localities are added to it. The number of pupils taken as a standard for determining the size of the proposed school is, in order of priority, that found in existing state schools, followed by that of subsidized, privately-owned schools. As to enrolment in subsidized private schools managed by religious bodies, this was not a factor; the general feeling was that these institutions provide a good-quality education and are quite capable of meeting the competition of the state school—all the more so as the population remains attached to them.

(b) The number of people living in a locality, or in groups of localities. The only reason for using this as a guideline was the lack of precision of available demographic data.

(c) The ease of getting from one place to another and the distances involved—both of them items of great importance when it comes to moving primary and middle-school pupils from one locality to another. Maximum distances from home to school are 4 kilometres for primary schoolchildren, 6 kilometres for middle schoolchildren, and 10 kilometres for the second cycle of secondary education.

As these brief reports make clear, techniques for deciding where new schools should be constructed are as a rule empirical and need to be adjusted to conditions actually prevailing in each country. None the less, regardless of the technique adopted, a number of basic principles must be observed and it may be as well to summarize them here:

(a) Begin with the first-level map; arrange for a link-up of the organization of supply for middle and secondary levels with that for the first level.

(b) After estimating 'net requirements' in each catchment area, see what they mean in terms of new schools required, without losing sight of size standards, time needed from home to school, etc.

(c) Identify the schools that have low enrolment figures, or enrolments close to minimum size in base year. A check must be made to see whether the number of pupils has been stable, increasing or declining over the preceding three or four years. A decline in numbers may indicate that the school is in a village which is losing its population. Closing-down can then be recommended if it is close enough to neighbouring schools, if the condition of its premises is not satisfactory and provided the features of physical relief and the state of the roads do not render travelling excessively difficult.[1]

(d) Make a distinction between highly-populated areas which can be expected to have a complete range of well-equipped schools and medium population-density areas which can be expected to have full-range schools provided there is amalgamation of areas of very low population-density, where solutions involving boarding facilities, school transport and satellite schools linked up with the central schools will have to be resorted to.

(e) Establish the largest population centres and the regional development poles. This will entail getting precise information on the area's short- and medium-term development plans, including road-building programmes and the bringing-in of utilities, projected co-operative and medical centres, and the prospects for expansion in agriculture, industry, mining and the tourist business.

(f) Identify the so-called first-, second- and third-class centres in conformity with national standards and respect this classification when deciding on the location of new schools. Identify the centres best served by the road network and those situated at cross-roads. Locate a sub-area's centre of gravity by weighting the distances between several inhabited localities with the number of children to be schooled in each of them. Take account of ease of movement from one place to another and of physical relief when estimating the amount of time from home to school and selecting the central village for the new school. In the normal way, the latter should be the locality which is most heavily populated and which has the highest concentration of official services, i.e. postal, telephone and medical services.

(g) Take account of the conditions of existing school premises and possibilities of enlarging them. Provide for schools of adequate size while continuing to aim at minimizing school-transport and boarding facilities costs. In the towns and cities, arrange for sufficient land in the new urban quarters to meet requirements. Take care not to freeze the lines of the school map, particularly in rapidly expanding areas; make a distinction between the short-, medium- and long-term measures to be taken.

If, as a result of applying the various criteria used to determine location of the new school (demographic increase and economic advance, ease of access, state of the premises, central position in relation to inhabited localities, requirements in the matter of transport, and reasonable school size) more than one conclusion is arrived at, then the procedure of continuous approach will have to be resorted to. It may be that two proposals with different options can be entertained and, in that case, a comparison will have to be made of the costs involved and of the respective advantages of each solution.

---

[1] If a general decline in numbers is expected, the case of all schools which will have enrolments near to the minimum standard size in the target year will have to be looked into.

3. *Cost/advantage analysis*

This summary of the principles to be adhered to, and of the techniques used in the case studies to determine new locations, confirms the empirical nature of the approaches followed. However, it is striking that when it came to sizing up the advantages and disadvantages of the different proposals evolved on those lines, recourse was had in each case to the technique of cost/advantage analysis.

(*a*) *Definition*

In theory, cost/advantage analysis may assume one of the following forms:

—a comparison of the costs of various solutions of equal efficacity, i.e. corresponding equally well to the goal in view. Here the least expensive solution will be the best;

—a comparison of the various solutions possible within the limits of a given budgetary level in order to determine their efficacity. Preference will be given to the most effective solution.

—the possible solutions differ as to costs and advantages. In this case, there is no reason to minimize the cost/efficacity ratio. All that the analysis procedure does is to bring out the advantages and disadvantages of possible projects without indicating which is the best solution from the point of view of efficacity.

Clearly, it is only this last form of analysis which really corresponds to concrete situations and appears to be a valuable instrument for the rationalization of decisions. In the important context of the school map, it is pertinent to ask to what extent such a technique is applicable.

(*b*) *Concrete applications in school map procedures*

Application is possible at two levels:

—*at central level:* when it is a case, for instance, of deciding on standards for premises and for physical facilities, choosing between various modes of school amalgamation (either dispersed or concentrated), opting for this or that method of school transport, or comparing schooling systems with or without lodging facilities, etc.;

—*at local level:* here the possible solutions have to be looked into one by one and a clear idea obtained of the consequences of each; in this way a 'balance-sheet' can be drawn up comparing the various solutions.

In practice (see Tables 35–38) the work of analysis demands that one make use only of such elements as are capable of being quantified, such as requirements in the matter of staffing, premises and physical facilities, distances from home to school, requirements in the matter of transport, and current and capital costs.[1] The estimates so arrived at are filled out with a qualitative appreciation of the consequences of this or that measure in the shape of the resistance of local people, the difficulties met with in ensuring the proper pupil/teacher ratio and schooling for girls, etc. In all this the work has to be done in detail, school by school, by calculating expected enrolments and estimating requirements in the matter of staffing, while meeting existing regulations, and obtaining an idea of costs on the basis of available information and applicable standards, etc.

[1] See, for example, the methodology described in P. H. Coombs and J. Hallak, *Managing educational costs*, New York, London and Toronto, Oxford University Press, 1972.

TABLE 35. Comparative analysis of total and per-pupil costs in two hypotheses of rationalisation (with or without maintenance of schools with one teacher) in County Sligo, Ireland

		Teacher cost		Non-teacher cost				Overall cost	
		Total	Per pupil	Transport	Per pupil	Other	Per pupil	Total	Per pupil
Maintenance of schools with 1 teacher									
1971	All schools	431 475	54	21 100	3	7 990	1	460 565	58
	Consolidated schools	147 486	69	7 700	3	2 152	1	157 338	73
1976	All schools	393 819	49	37 660	5	7 990	1	439 469	55
	Consolidated schools	109 830	51	24 250	11	2 152	1	136 232	63
Change	All schools	−37 656	−5	+16 550	+2	—	—	−21 106	−3
	Consolidated schools	−37 656	−18	+16 550	+8	—	—	−21 106	−10
Non-maintenance of schools with 1 teacher									
1971	All schools	431 475	54	21 100	3	7 990	1	460 565	58
	Consolidated schools	268 299	63	12 075	3	4 227	1	284 601	67
1976	All schools	385 974	48	64 900	8	7 990	1	458 864	57
	Consolidated schools	222 798	53	55 875	13	4 227	1	282 900	67
Change	All schools	−45 501	−6	+43 800	+5	—	—	−1 701	—
	Consolidated schools	−45 501	−10	+43 800	+10	—	—	−1 700	—

SOURCE Jacques Hallak and James McCabe, op. cit. (study on County Sligo, Ireland).

TABLE 36. Senior second-level classrooms available, required and eliminated at Aurich, H1 and H2.

Hypothesis	Schools in Aurich commune	Classes available		Proposed to be used for				Classes required or eliminated		Overall estimates	
		G	S	Gymnasium	Fachoberschule	DS/BFS	Sekundarstufe 1	G	S	H1	H2
H1	Lambertischule	17	5								
	Lindenschule	3	–								
	Reilschule	21	5								
	Realschule	19	9					−19	− 9		
	Berufsschule	–	–					–	–		
	Gymnasium	39	10	*	*			−23	+ 6		
	Schulzentrum	8	8	*	*	*	*				
		32	32			*		+17	+19		
								−42	− 9	−51U	
								+17	+25	+42U	
H2	Lambertischule	17	5								
	Lindenschule	3	–								
	Reilschule	21	5								
	Realschule	19	9					−19	− 9		
	Barufsschule	39	10								
	Gymnasium	39	10	*				−23	+ 6		
	Schulzentrum	8	8	*	*	*		+14	+17		
								−42	− 9		−51U
								+14	+23		+37U

G = general classroom; S = special classroom; DS = Duales System; BFS = Berufsfachschule.

SOURCE H. -J. Back *et al.*, op. cit.

TABLE 37. Transport needs for cycle III: pupils/km. per day, Costa Rica

Region	Alternative 1	Alternative 2
ZA	641	1 413
SRU	162	2 315
SRR	2 304	2 304
NPU	515	1 450
NAR	0	0
Total	3 622	7 492

TABLE 38. Construction needs in two alternatives of the school map, cycle III, Costa Rica

	Alternative 1	Alternative 2	+/−
Construction type B	4	3	+1
Construction type D	1	2	−1
Construction type 100–150	5	0	+5
Revision and reconversion	6	8	−2

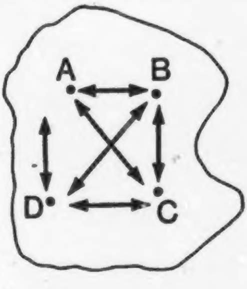
SOURCE J. Hallak *et al.*, op. cit. (study on Costa Rica).

It is worth while citing an example of how systematic analysis can be used to gauge the advantages and disadvantages of various measures for the organization of education supply, especially as it bears upon a solution envisaged in a number of countries, namely that of schools amalgamation affecting a number of communes or villages.

(*c*) *Schools amalgamation*

Amalgamating intercommunal schools is widely regarded as a solution to the problems of providing schooling in country districts, both at primary and pre-school level. There are two possible forms of amalgamation, as follows:

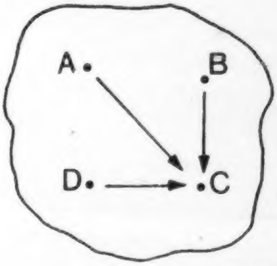
(*i*) *Dispersed amalgamation* (*circular permutation*). Let us take the simplest case, with four communes A, B, C, and D, and three elementary sections and a nursery section. These are scattered over the four communes, that is to say there is a preparatory section at A, an elementary section (2 years) at B, a middle-school (2 years) at C and a nursery section at D (see Figure 20).



A.	Preparatory section	CP
B.	Elementary section	CE1 CE2
C.	Middle-school section	CM1 CM2
D.	Nursery section	

FIGURE 20

(*ii*) *Concentrated amalgamation* (*at the central village*). In this case there is concentration at C, with a school with three elementary sections (CP—CE—CM) and a nursery section (see Figure 21).



C.	**Preparatory section**	**CP**
	Elementary section	**CE1** **CE2**
	Middle-school section	**CM1** **CM2**
	Nursery section	

FIGURE 21

Of course, where a larger number of communes is involved or a greater number of schoolchildren, there is a possibility of five primary classes instead of three (i.e., one per section) or even of duplication of certain sections.

Each of these two kinds of amalgamation has its advantages and its disadvantages. Where dispersed amalgamation is opted for all the communes, or at least most of them, continue to have a school of their own, which means that there is less likelihood of offence being given locally. Moreover, maximum utilization of existing premises results, at least initially, in an avoidance of large capital expenditure. Against this, however, canteen services are necessary at each place where schooling is provided.

One significant disadvantage is that school transport is more complicated and more expensive and longer distances are involved. Finally, since each teacher is independent there is the danger, from the pedagogic point of view, of a failure to create a degree of harmony as between classes. This difficulty can be overcome by appointing a headmaster to oversee the whole. Apart from the resulting pedagogic advantages, such headmaster posts would serve to encourage teachers themselves to look for promotion in the rural context.

All in all, it is possible that this kind of amalgamation will cost less at the outset but may turn out to be more expensive in day-to-day operation. The concentrated form of amalgamation also has its advantages and disadvantages; from the psychological point of view first of all, it is a method less easy to introduce since it means that a number of village schools must be closed down. Apart from the fact that existing premises will no longer be used, there is the additional shock of the teacher's leaving. However, here also there is nothing against letting the teacher stay on in the village; the problem of accompanying children from home to school would be resolved in this way by having the teacher travel with them. Such a system results in greater capital expenditure at the outset, but it does make possible interesting developments such as the provision of sports equipment in the context of a school gymnasium or else special arrangements for the nursery section in the shape of rooms for games and for meals, and appropriate sanitary facilities.

Here, as in the previous instance, a thorough preliminary study is necessary, taking account not only of actual demographic trends, but also of their probable evolution, so that in the longer or shorter term useless capital expenditure is avoided.

Before this chapter is concluded, a word needs to be said about the obstacles connected with adoption of school map proposals.

Rationalization of the school map implies significant political difficulties, inasmuch as it involves provision of education of a 'voluntarist' character. Implementation of the school map can be met with resistance:

(a) by local people who see one school being done away with and another converted, or who do not get the kind of school which they have been clamouring for in their neighbourhood;

(b) by teachers who, when a school is closed down, fear that they will be transferred outside their home-area;

(c) by families who, in certain cases, refuse to send their daughters to co-educational schools, or else fear that prestige schools are to be closed down following introduction of an education system which is more balanced and uniform, but of a lower standard.

Introducing the school map can give rise to considerable amounts of discontent and have political implications for the life of the collectivity. The map will remain at the theoretical stage, and will not be brought into practical effect, unless certain conditions are respected. These include:

(a) introducing the map in accordance with ministerial instructions and decisions at the highest level; this, although a necessary condition, involves the danger of 'institutionalizing' the school map as a powerful instrument at the disposal of a centralizing state bureaucracy;

(b) ensuring that it is the work of a team consisting of representatives from all relevant groups, namely, central administration, local authorities, inspectors, teachers and pupils' parents. If arrangements are made to involve representatives of the various categories concerned under the joint ægis of central and local authorities, it should prove easier to introduce the school map in an efficacious manner;

(c) ensuring that where a school is closed down or affected by an amalgamation, the event is accompanied by a net gain for the village community having to put up with the change. If pupils' parents can be convinced that, in compensation for the closing-down of their local school, their children will enjoy improved schooling in the shape of better teachers, better pupil/teacher ratios, better teaching materials, etc., then the spirit of opposition will gradually die away. One of the aims of cost/advantage analysis is to delineate clearly the pros and cons of the proposed changes.

Once a diagnosis of the map for the base-year has been carried out and projections of the numbers of those due for schooling are completed, a 'supply-demand balance-sheet' can be established in respect of each district, and the 'surpluses' and 'shortages' of pupil-places calculated.

Arrangements must be made for the reconversion of surplus available pupil-places.

The question of where schools should be located inside each perimeter may mean resorting to operational research techniques, but the procedure will usually be empirical, taking the form of a continuous approach system once certain criteria have been decided on.

It is advisable to consider a number of schemes for the meeting of supply requirements and to draw up a cost/advantage balance-sheet for each one of them.

General conclusion

Putting educational policies into effect generally raises a number of difficulties deriving from the definition of the policies themselves, the manner in which they are implemented, and the reactions they elicit in the social sectors concerned. The importance of the part played by the school map has been demonstrated here by means of illustrations taken from case studies (Part A) and by the survey of methods followed in drawing up the map (Part B).

1. The description of the case studies shows how varied are the fields in which the school map can be applied.

The report on the way in which the goal of universal primary education is actually being worked for led to the conclusion that an education supply organized for that purpose implies more than merely getting and using financial and human resources, which in any event exceed the estimated requirements written into the national plan; achieving the aim of universal education may mean, for example, building a road network to serve inhabited areas all the year round and/or effecting population amalgamations in order to produce villages of a size justifying the setting-up of public services and/or persuading qualified teachers to take charge of schools in remote country districts and/or finding land or premises in towns and cities to increase the number of pupil-places and thereby take care of a considerable growth in population in urban areas, and so on.

The reports on the introduction of educational reform measures underline the vital part played by the school map in gauging the actual possibilities of putting the reforms into effect. Thus, prolonging (as in the USSR) or reducing (as in Nepal) the number of years of primary schooling calls for a pretty complete remodelling of the existing stock of schools, while the factors that dictate the rate of such remodelling and the way it is effected are not only pedagogic and economic in their nature, but also geographical, demographic, administrative and political. Likewise, secondary-education reform, the order of the day in a number of countries, is not really possible without the introduction of a school-map procedure. Such was the case in France with the reorganization of second-level education and such will be the case in Western Germany when the 'horizontal' system is brought in to replace the vertical system of *Hauptschulen*, *Realschulen* and *Gymnasium*.

Studies undertaken on how to make more effective use of the resources devoted to education show how the school map is used to analyse the actual conditions in which this purpose will be achieved. One possibility, and this was done in Lebanon, is a complete restructuring of supply by means of the amalgamation of existing schools into standard schools capable of operating at a minimum cost level, initial investment expenditure being largely offset by the economies effected in operational expenditure. Another suggestion, and the example of Casablanca springs to mind, is for increased utilization of private schools together with various formulas for expanding the network of state schools, with eventual adoption of the least costly solution. The secondary-school map may also be organized in complementary fashion with the elementary-school map so as to ensure a satisfactory use of premises and physical facilities—'standardization' is one of the essential dimensions of the school map.

A number of other important considerations have emerged from what has been said concerning the case studies; one of the most noteworthy was highlighted in the report on the Ivory Coast, where prior conditions for bringing in educational television were examined and the conclusion was drawn that in certain areas of the country it will not be brought in in the foreseeable future, even if technical problems connected with reception and transmission are successfully overcome.

2. The methodological section (Part B) of this book also emphasizes the vital rôle played by the school map in putting education policies into effect.

The diagnosis throws light on inequalities in levels of educational development, in schools' operating conditions and in the relation between education supply and education demand. Among other things, these inequalities show that the goal of equal access to education is seldom respected, a situation which gives rise to real problems for those in charge of educational policy.

Any consideration of the prospective trend of demand necessitates an 'interpretation' of national education aims at the level of each area and locality; this draws attention to the need for criteria concerning geographical (and sometimes social) distribution of the resources available for education—a factor which educational policies cannot ignore.

The comparison of prospective requirements with available supply, the elaboration of proposals for rationalizing the school map, and submission of these proposals to a procedure of cost/advantage analysis are, of course, so many stages to be gone through; and each of them has a natural part to play in the implementation of any education policy that aims at having a medium- and long-term influence on the school system.

To sum up: both the methodological steps which it involves, and the wide variety of fields in which it can be applied, reveal the school map as fulfilling a number of important functions in relation to the implementation of education policies.

3. None the less, the reader will have noted the difficulty involved in showing just what the school map is and in giving a general definition of it. It is not merely the carrying-out of a schools policy or an education plan; it is also the working-up of a plan, and the working-out of a policy. Moreover, it is not merely the business of central administration and of the regional services, it is also the responsibility of all the groups concerned and, in particular, of pupils' parents. Nor should it be envisaged solely in the context of the schools system; it must take its meaning

from the set of geographical, sociological, economic and other conditions in which it functions. Again, the techniques described in preceding chapters are not limited to any one discipline; they draw upon whatever economics, sociology, demography, geography and political and administrative sciences can offer; like any other method of management—for the school-map is a method of management—it has to be multi-disciplinary. Finally, we have indicated (and this list of observations should not be taken as exhaustive) that, important as it is, the methodological procedure of the school map is only one element, a single element, in the overall process of decision-taking. This is the case, and this will always be the case, when decisions have to be taken collectively.

We can, in fact, see the introduction of the school map as a step in the direction of a methodology for the rationalization of collective decisions. The kind of decision to be taken ranges from the simplest and most elementary, such as the type of physical facilities a school is to have, to the most complex, such as the precise location of a new school, and the most difficult, such as the incorporation of private schools into the state school network.

In the absence of a unit of measure which would enable them to gauge social usefulness and thereby make a comparison of different solutions possible, technicians content themselves with putting a numerical value on what they can, that is to say the direct costs involved in each of the solutions, and the 'quantifiable' advantages of each. In theory, the technique of decision-taking consists in opting either for the least expensive solution of those offering a minimum of effectiveness or choosing that which offers the greatest measure of effectiveness at a given cost. In practice, it is fortunately a very rare thing to see this technique being applied without qualification; the lack of precision of the information used for purposes of analysis, together with the incomplete nature of the data, cause those called upon to take decisions to be very prudent when they are asked to decide for this or that solution. But this is not all; with adoption of the cost/advantage technique determination of the best decision is made dependent on two systems of weighting, that of costs involved—what relative 'weight' is to be allotted to social costs?—and that of advantages to be gained—how are the performances that attach to various effectiveness criteria to be incorporated? As a result one can justify any decision taken, provided the 'proper' system of weighting is adopted. Finally, in so far as the school map in particular is concerned, any solution adopted at area level corresponds in practice to an 'under-optimisation'; in countries with decentralised systems under-optimisation is likely to be limitless, and inconsistencies between decisions on the school map may generate great difficulties; while in countries with centralised systems, under-optimisation stands in danger of being 'forgotten', or sacrificed to optimization at national level. This is why those called upon to take decisions prefer as a rule procedures involving negotiation and compromise.

In short, while the methodological school-map procedure is an important one, and while it performs well as an instrument for rationalizing collective decision-taking, there can be no question whatever of its being substituted for the other factors affecting decision-taking, as the following example will show. Suppose a school-map technician comes to the conclusion that he will have to close down a school because its enrolment is below the government's minimum standard level of 50; the decision-making body may none the less keep the school going and accept that its enrolment is going down to 20 or 15, either because the localities it serves are too isolated to be looked after by any other school, or because it is attended by a minority racial group which will regard its closing down as a discriminatory measure against them, or because there is a possibility of increasing the enrolment by getting more girls to school, or for some other reason of this kind. It is clear that 'on-the-spot' factors likely to influence decisions, and in particular 'micro-decisions', are often far too important to be disregarded, or alternatively too minor to justify their being included in a methodological formula of general application.

4. Again, it is evident that the methodological school-map procedure bears a striking resemblance to the procedure followed in any planning exercise. In fact, what has to be done in each geographical area of significance, which means the whole country in the case of specialized courses and higher education, the province or the region for secondary and/or middle school, and the sub-region for primary and nursery schooling, is (i) to make a diagnosis of what already exists in the way of physical and human resources, (ii) to obtain a clear idea of the trends in education demand or of requirements in the matter of education, and (iii) to determine the practical and real possibilities of meeting these requirements. This exercise in regional or local educational planning will be devoid of meaning unless three conditions are met:

(a) it must be possible to carry out the exercise in each region and each locality in the same way and by using the same means. There must be a guarantee, and this is one of the purposes of the pilot exercise, that the methods followed are standardized; a procedure must be established for collecting the information needed, and above all there must be skilled staff to see the work through properly. Experience demonstrates that many countries are far from being in a position to meet these conditions and cannot draw up a national education plan, even at central headquarters. We would issue a word of warning about the danger of over-hasty decisions; it is not enough to make a decision to introduce a school map simply because they are the fashion and one would like to discover in them a universal panacea. Introductions and implementations of the school map are, in fact, two very different matters. Each country has to work out its own methodology, not merely to take account of the specific conditions prevailing, but also to match the material and human resources which in practice it can put to work for the purpose.

(b) Steps must be taken to integrate the work done in the various regions and localities. And here we come to the question of decisions to be taken on how educational funds are to be allocated. If one adds up the demands made by each region one will certainly end up with a figure well above what the Ministry of Education's budget can finance. What are to be the criteria for apportioning the shortage? Which regions, and which proposals for expansion, are to enjoy priority treatment? In asking this, we have in mind those countries where state financing bears a large, if not preponderant, share of the burden; but other questions, and more serious ones to our way of thinking, have to be faced when the bulk of funds for education come from the regions themselves. Is the state to stand aside and watch the wealthiest and most go-ahead regions increasing the gap between themselves and the poorest and least well-provided regions?

The fight against regional disparities is an unquestionable concern of all governments, but bringing it to a successful conclusion depends on a number of assumptions, in particular on the assumption that a voluntarist policy for regional planning and national development will be adopted. This means that the school map, promoted to the status of a regional and local education plan, must be part and parcel of the regional development plan. Drawing up regional development plans as part and parcel of a national plan gives rise to the same sort of methods, resources and procedures problems as does the drawing-up of the school map; there is no sense in building up a *de luxe* methodology which has no chance of being applied. Ambition here must be geared to what available means will permit.

(c) The school map must fit properly into the decision-making process. We would mention here that we have shown preference for a planning process that is flexible and includes participation, involving decentralisation of the machinery for working towards decisions, and a will on the part of the politicians to play the game where task-sharing is involved. It is probable that the idea of task-sharing is a powerful one, but like all powerful ideas it is easier to decide on in theory than to realize in practice. This being so, are we to give up the proposal for the school map if the prior condition of participation is not met? And are we to give up the experiment of task-sharing because the obstacles in the way are difficult to remove? It has to be admitted that a decision on a planning system is a political one. Participation is an essential part of it, reducible to a system of values. If we emphasize this system of values, it is because we feel it is the only one consistent with the planning principles advocated in this work. At the same time, it is necessary to admit that the pluralism of our societies opens the door to other systems of values and other planning options, ranging from pure *laissez-faire* to rigid technocratic centralism, with all sorts of formulas *en route* from one to the other. The school map has a place in every country—provided it shows itself consistent with the set of socio-political conditions in which it has to function. But in no two cases will it be the same school map; it will neither operate in relation to the same terms of references, nor serve the same purposes.

5. All of this suggests the need to complete our treatment of the school map by outlining a typology. At the risk of over-simplification, we can identify three categories of countries on the basis of the ideologies underlining their planning systems; these are the following:

(a) Countries with a tendency towards the ideal of planning on a participatory basis. The price that has to be paid in the form of some disorganization of decision-taking processes, a constant questioning of the purposes of the plan, and the means to its end, etc., is considered to be fully justified and offset by the expected progress towards democratization, the gradual cutting-out of bureaucratic processes, and the resultant breaking-down of social barriers. This is tantamout to betting on the future, and while there is no actual proof that the wagers have any chance of coming off, at least the political options which inspired them are obligatory for any champion of democracy in political affairs. What is being done in China, of which we know next to nothing, is said to exemplify this approach. The declarations of intent of the Peruvian educational reform and in particular those relating to nuclearization, as this is described in the official report, find their inspiration in the same ideal of a task-sharing and participant-controlled democracy.

As a follow-up to the research work on the school map, it may be useful to initiate a project covering the investigation of what is being done in these countries, with a view to recording the progress they may have been able to make, the difficulties they have encountered, and the lessons that can be drawn at the international level.

(b) Countries with a long tradition of more or less centralised planning, where task-sharing has been to some extent institutionalised in representative boards which may, or may not, have specialized in the taking of decisions on the school map. Preparatory work for decision-taking is supposed to be done by administrative departments acting as 'technical secretariats' for the representative political bodies, that is to say, the boards which enjoy powers of decision-taking. It is legitimate to ask how these boards operate. What is the actual distribution of the work done, and what are the responsibilities incurred, as between the regional and local school-map secretariats on the one hand, and the secretariat of the national board on the other? What, in practice, influences the decisions taken at the various levels? Can it really be said that the boards are representative, and if so, can it be affirmed that they retain their liberty of action when it comes to decision-taking? Or are they just steam-rollered under the opinions given by the secretariat experts and, when it comes to the taking of decisions, merely acting out a formal part in a pretence of task-sharing? All of these are questions which call for research into the sociological, political and administrative features of decision-taking, and which would provide a useful extension of the work done on the school map.

Even if we take the central question of decision-taking (and of task-sharing) as solved, we come up against another considerable difficulty which deserves mention. It is that of the relationship between educational supply (as provided by the school map) and the demand for education (as voiced by the public). Some countries go so far as to decree that pupils shall be affected to this school or that, and this education stream or that, or/and to the point where they restrict admission to certain lines of study for economic reasons, including the country's manpower requirements and its capacity to finance education. In still others it is considered that the balance between educational supply and demand is to be achieved through an effective system of pupil guidance. We believe that the part to be played by guidance can be an important one, but that there are important prior conditions that must be met, including a thorough acquaintance with education demand. What is in question at one and the same time is 'satisfied' and 'unsatisfied' demand, demand arising 'spontaneously' and 'under guidance', and so on. These observations suggest two research projects which would represent an extension of the work of investigation on the school map.

A first project would seek to examine and define the nature of social demand and of the factors determining it, so as to bring about improvements in the procedure for setting targets and deciding on the means for attaining them, i.e. the school map. A second project would deal with the machinery of pupil-guidance, and examine the part this can play in achieving a balance between education supply and demand.

(c) Finally, our typology is completed by a third, heterogeneous group of countries. Here we find plans with little real conviction behind them, plans which some will refuse to recognise as such, where there is no idea of task-sharing, either because there is next to no interest in it or because it is politically inadmissible, and where the school map is actually reduced to being an exercise in programming capital investment in the state sector—the only one capable of being controlled to a certain extent. Certainly those in charge are unwilling to admit that *laisser-faire* is their chosen option, but experience shows that it is the rule in practice, even if the decisions taken, and frequently taken to give an official stamp to an existing state of affairs, tend to create the opposite impression. The general purposes of education approved by all, and embracing the ideal of providing equal opportunity of access to education, are none the less considered to be compatible with the spirit of liberalism, whether progressive or not, reigning in the countries in question. What has been said here, in spite of its general nature, would suggest the need for research into:

(i) the meaning of the school map, the part it plays, and the interest taken in it, in the case of education systems which often, to a very large extent, elude control by public authorities and are in the hands of certain organized private groups with, or without, the purpose of gain;

(ii) the possibility of promoting the attainment of the aim of democratization (equal opportunities) by bringing in rational and equitable school maps, local, regional and national. This, of course, does not imply that an equitable supply will suffice to ensure equitable school attendance.

It is in the spirit of the remarks just made that this work may be brought to a close. Wherever one finds ill-adapted content, discriminatory methods, and purposes imposed on the system by dominant social groups, equality of opportunity must be considered a mere pretence at best. As long as society continues to be imperfect, inegalitarian and unjust, the school will continue to facilitate reproduction and preservation of the social structure; the fight for changes, for a greater degree of correspondence between proclaimed purposes and steps actually taken, and for social equity, must be waged in society, in the family and in the classroom.[1] An equitable school map is only one link in the complex chain of factors determining equality of opportunity.

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[1] See J. Hallak, *A qui profite l'école?*, Paris, Presses Universitaires de France, 1974.

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